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American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES

Pouring Centrifugal Castings in Horizontal Position (Courtesy Pettibone Mulliken Corp.)

Board of Directors Chart Course of A.F.A., Page 2. A.F.A. Stork Wings to Portland with 29th Chapter, Page 3. British Foundrymen Investigate Basic Cupola Operation, Page 4. Draft A.F.A. Technical Development Program. See Page 10.

February 1945

Why Inspection of Castings Continues Its Important Role In Selling Quality Products

UP UNTIL the present World Conflict, foundries had not laid too much stress on inspection of their castings. Certainly ways and means, such as magnafluxing, radiography, and x-ray, were available for locating defects; also jigs and gauges to check dimensions. But how many foundries resorted to this type of inspection before the war and how many do at present?

The foundries that do not include routine inspection in their operations complain, because years ago they made the same castings and they fulfilled their respective duties—at least they assume they did. This may be true in a few cases but, when customers' machinery broke in line of duty, it was difficult to convince the foundry of defective workmanship.

Our present increase in production of materials needed in the war effort shows definitely that rigid inspection is still not good enough unless we use modern equipment of all types to locate defects. How many times were *you* asked to make test bars of each heat or each casting before the war? How many foundries made physical and chemical reports daily, let alone each heat or individual casting? You, as foundrymen, know the answer.

From an inspection standpoint, it appears that in the future your customer will continue to demand adherence to present procedure, mainly because, justifiably or unjustifiably, quality of castings is a question in their minds.

Before the present conflict, many of your customers eliminated castings from the equipment they manufactured, due largely to doubtful uniformity of quality in castings. The customer is going even further now, not because castings are unsuitable but because you, as foundrymen, have not helped him to solve his problems.

This was not because you could not, but you did not foresee the engineering of your castings. Consult with your customer's engineers. If design can be changed to make a more suitable casting for molding, advise him. A good many engineers are not familiar with your problems. You explain to them, they listen to you, results are gained.

Many good castings have been scrapped in the past few years, which might have been salvaged by proper inspection methods. Why not staff your inspection department with mechanics who know the methods and pattern equipment used in your shop, so that they can confer intelligently with your foundry superintendent on your customers' castings and requirements and suggest new or revised production methods?

Sell your customer on quality—quantity will come! The American Foundrymen's Association has an organized National Committee on Inspection of Castings, comprised of men, including metallurgists and purchasing managers, who are familiar with practically all types of castings. It is their purpose to set up methods of inspection according to customers' requirements and extend to members its wholehearted support.

If you, as a member of A.F.A., have any recommendations or comments relative to inspection that are of a constructive nature, and which you believe will help to bring about sound inspection procedures in foundries, kindly forward them to the Inspection of Castings Committee, in care of the American Foundrymen's Association.

Harold W. Warner

H. W. WARNER, *Chairman,*
A.F.A. Inspection of Castings Committee

HAROLD W. WARNER, *General Foundry Inspector, Allis-Chalmers Mfg. Co., Milwaukee, is Chairman of the A.F.A. Inspection of Castings Committee which was organized a year ago under the chairmanship of M. D. Johnson, Chief Inspector, Caterpillar Tractor Co., Peoria, Ill. The principal objective of the Committee has been set forth as showing the benefits of castings inspection to the consumer.*

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American Foundryman

FEBRUARY 1945

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The American Foundrymen's Association is not responsible for statements or opinions advanced by authors of papers printed in its publications.

Published by the American Foundrymen's Association, Inc., 222 West Adams St., Chicago, Ill., for the purpose of presenting Association and Chapter activities. Published monthly. Subscription price, to members, $1.00 per year; to non-members, $1.50 per year. Single copies, 20c.

Entered as second class matter July 22, 1938, at the post office at Chicago, Illinois, under the Act of March 3, 1879.

BOARD OF DIRECTORS

Hold Mid-Year Meeting

TO CHART THE COURSE OF A.F.A.

THE Board of Directors of your Association met on January 17 for its mid-year meeting. All members of the Board were present. One of the important matters requiring discussion and decision was the January 3 announcement of the Government's action restricting conventions in 1945 for the purpose of conserving transportation and hotel facilities.

In discussing the subject, The Board was appraised of the fact that the program for the 4th War Production Foundry Congress, scheduled to be held in Detroit, April 30-May 4, 1945, was well under way; that many convention papers had been submitted; that the tentative program was ready for announcement; and that hotel application blanks had been approved for printing.

The preceding day, on January 16, a meeting of the Executive Committee was held and at that meeting, careful consideration was given to what action should be recommended to the Board of Directors. As a result, the Executive Committee proposed to the Board of Directors that the Detroit Foundry Congress should be cancelled, and that an emergency program of A.F.A. activities, that would fulfill in every possible way the Association's obligations to its membership and to the industry in general, be substituted.

1945 Meeting Cancelled

Upon presentation of this resolution to the Board of Directors, the Board voted unanimously for the cancellation of the Detroit Foundry Congress and for substitution of an emergency program of A.F.A. activities. Immediately following the decision of the Board, President Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., sent the following telegram to Director of War Mobilization James F. Byrnes:

"Notwithstanding the virtual completion of plans for the 49th Annual Meeting and 4th War Production Foundry Congress of the American Foundrymen's Association, our Board of Directors has voted to cancel this meeting, nationally announced for April 30-May 4, in Detroit.

"While the national meetings of the American Foundrymen's Association now are directed primarily to aiding the more effective production of castings for war purposes, we believe that these purposes may be effected through processes involving no large gatherings and through the full utilization of avenues now open for consultation with Army and Navy ordnance. The Association will continue and extend its work in the interest of war production through every available means.

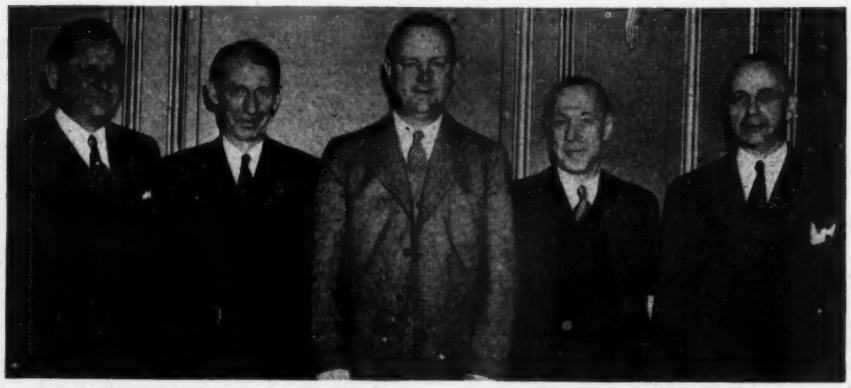
"Recognizing the necessity for minimizing travel during this crisis we are in full accord with your program and unanimously subscribe to your request."

Adopt Emergency Program

The emergency program of A.F.A. activities as voted by the Board of Directors is of a general character and details have not, as yet, been fully determined. An announcement of the new program, which it is intended will fulfill in every way the Association's obligations, will be announced at a later date.

Meanwhile, authors of papers, convention speakers and others who were scheduled to participate in the cancelled 1945 War Production Foundry Congress have been notified of action of the Board of Directors and have been requested to proceed with the preparation of their papers at the earliest possible moment, so that manuscripts may be in the hands of the National Office, properly reviewed by the Program and Papers Committees. This is essential so that proper planning can be done to assure the dissemination of this important information to the membership of your Association. All chapter chairmen have been notified of the action of the Board and have been requested to notify members of their chapters and their local newspapers.

Your officers, directors and members of the National Office Staff call upon you for maximum cooperation in making the substitute planning successful, so that the American Foundrymen's Association will be able to render to you, and other members of the industry, maximum possible service under these present war-time restrictions.



Five National Presidents of A.F.A. at joint luncheon of Board of Awards and Executive Committee in Chicago, January 16, (left to right) L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala., President 1940-41; H. S. Simpson, National Engineering Co., Chicago, President 1941-42; D. P. Forbes, Gunite Foundries Corp., Rockford, Ill., President 1942-43; L. C. Wilson, Reading Steel Casting Div., American Chain & Cable Co., Inc., Reading, Pa., President 1943-44; R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., current President.

A.F.A. WINGS TO PORTLAND TO INTRODUCE "OREGON" AS 29th A.F.A. CHAPTER

Board of Directors Approves Second New Chapter in a Month

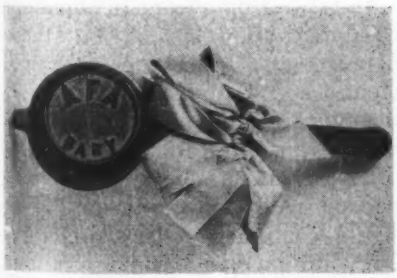
ON January 19th, at Portland, Oregon, the 29th Chapter of the A.F.A. was born.

At a meeting held at the Congress Hotel, Portland, the local committee of foundrymen, who have been working toward the formation of an A.F.A. Chapter in that area, was able to announce that a petition to the A.F.A. Board of Directors had been fully approved for establishing this 29th A.F.A. Chapter. Some sixty foundrymen members and guests of the A.F.A. assembled at a dinner meeting that evening.

This meeting was the outgrowth of a movement started the evening of November 3rd when the first meeting of the group was held in an effort to bring to the foundrymen of the district an A.F.A. chapter. The local committee was composed of members from Portland firms as follows:

Chairman—Wm. R. Pindell, Northwest Foundry & Furnace Works.

Secretary—A. G. Hobson, Western Foundry Co.



This A.F.A. "baby" rattle is presented to new chapters, until another member is "born." Central Ohio Chapter came into the A.F.A. family on December 20, so this rattle had but a short stay in Columbus before going to Portland.

E. G. Huffschmidt, Western Foundry Co.

A. R. Prier, Oregon Brass Works.

Frank Miller, Western Industrial Supply Co.

Nate Weinger, Portland, Oregon.

Inasmuch as the formal report of the meeting was not available at the time this issue of AMERICAN FOUNDRYMAN went to press, all that can be said is that the speaker of the evening was Charles B. Schureman, Technical Consultant for the F. E. Schundler Co., Joliet, Ill. Mr. Schureman's address covered "Synthetic Molding Sand Problems and Solutions." The speaker, who has addressed many A.F.A. chapters, gave an excellent talk, with very practical information on foundry sand problems and their solution.

A more detailed report of the meeting will appear in the next issue of the AMERICAN FOUNDRYMAN.

The Association is pleased to welcome this youngest "baby" to our chapter family, especially since it is realized that the Oregon group is composed of "live" and active foundrymen, so the Chapter will be a fine addition to our Western representation. All will watch with interest its growth in serving our members in this territory, for the group is emphasizing the A.F.A. motto of

"Coming together is a beginning,
Keeping together is progress,
Working together is success."

Book Review

Ferrous Metallurgy, Vol. 3, Metallography and Heat-Treatment of Steel, by Ernest J. Teichert. Second edition. Published by McGraw-Hill Book Company, Inc., New York, 1944. Red cloth bound, 577 pages, illustrated. Price, $5.00.

This book is the third of a series of books on ferrous metallurgy. Volume 1 reviews the fundamentals essential to the understanding of all metallurgical processes. Following this review are chapters which describe the manufacture of pig iron, cast iron, malleable iron, wrought iron, and steel made by the cementation and crucible processes. Volume 2 discusses the methods of melting and fabricating steel. Volume 3 is concerned with the metallography and heat treatment of ferrous alloys.

The first four chapters discuss elementary metallographic techniques, non-destructive and destructive testing, and the principles of alloy systems.

The remaining chapters discuss the iron-carbon diagram, metallography of cast steel and cast iron, mechanical and heat treatment of plain carbon steels, precipitation hardening, grain size in steel, case-hardening, alloy steels and their selection, and cast irons and their heat treatment.

The author has recognized that the extensive scope of the book permits only a general treatment of each subject and has included a list of references with each chapter for those who wish to make more detailed studies. Questions at the end of each chapter will aid the student in checking his understanding of the subject matter.

BRITISH FOUNDRYMEN
Investigate Basic Cupola Operation
TO REDUCE SULPHUR AND PHOSPHORUS

• This report of the Melting Furnaces Sub-Committee of the Technical Committee, Institute of British Foundrymen, is the examination of results obtained in practice with basic-lined cupolas. It is reprinted here from the "Foundry Trade Journal" because of the interest it will have for foundrymen in this country.

ONE of the most serious restricting factors in the use of cupola melting for certain applications is the inability to reduce sulphur and phosphorus contents during the melting operation.

In normal cupola practice, acid, *i.e.*, firebrick and ganister, linings have invariably been used, and with this type of lining it is not possible to obtain the basic slag necessary for desulphurization and dephosphorization. Recent improvements in basic refractories, and particularly the development of a basic patching material, have caused renewed interest in the possibilities of achieving these objects in a basic-lined cupola.

In the past, the great disadvantage of burned dolomite as a cupola lining material has been that, on contact with atmospheric moisture, it hydrates and disintegrates. This feature also precluded the use of a wet patching material for repairs. A new stabilized dolomite clinker has now been produced[1], and is available both as a ramming material for the preparation of monolithic linings and also in the form of bricks.

A stabilized dolomite cement also has been developed, which can be mixed with water and applied as a patching material very much in the same way as ganister is used in an acid cupola. Some details of the properties of these materials are given in Table 1. The patching can be applied successfully to other basic refractories, such as magnesite and chrome magnesite bricks.

Examination of Results

The first details of the use of these materials in a production cupola were published by Renshaw[2], and dealt mainly with the opportunities for desulphurization which a basic lining affords. The Melting Furnaces Sub-Committee in investigating this subject has had made available to it further information, which opens other very interesting possibilities, particularly with regard to the question of dephosphorization.

While the Sub-Committee is still actively engaged in examining the results obtained in practice with basic-lined cupolas, it feels that the information at present available is of sufficient interest and importance to warrant the publication of this First Report, which gives an account of the work carried out to date.

The thanks of the Sub-Committee are due particularly to E. S. Renshaw and to the management of the Ford Motor Co., Ltd., Dagenham, Essex, for permission to publish the results of the preliminary experiments on dephosphorization. The Sub-Committee wishes also to record its indebtedness to E. Shaw and the Refractory Brick Co. of England, Ltd., for data regarding the stabilized dolomite materials.

Previous Work

Several references are made in the literature to the use of basic cupolas, but usually these were unsuccessful, partly because no satisfactory method of patching had been developed, and also because of the difficulty of keeping moisture from the sintered dolomite linings used. The most important published information is contained in a paper by Heiken[3], who used basic cupolas between 1905 and 1928, at first experimentally and later on a full production scale, for steel making by the converter process.

The main object in using a basic lining was to obtain metal of low sulphur content from the cupola, but other factors noted by this author are of interest. It is also of interest to note that the work on desulphurization by Renshaw previously mentioned and also that on dephosphorization, to be dealt with later in this report, was carried out without knowledge of the results of Heiken.

The first experiments reported by Heiken were carried out in a cupola of 20-in. diameter lined with magnesite bricks. A highly basic slag was produced by additions of dolomite and fluorspar. Using charges of 40-60 per cent hematite pig iron and 60-40 per cent steel scrap, the average sulphur content of the molten metal was reduced to 0.017 per cent. This compared with an average figure of 0.077 per cent, using similar charges in a furnace with an acid lining.

Increased Carbon Content

The carbon content increased from 2.85 per cent average from the acid furnace to 3.69 per cent with the basic lining. The phosphorus content of the metal fell from an average of 0.091 to 0.059 per cent in the basic cupola, a phosphorus reduction of 35 per cent simultaneously with the removal of sulphur. The average silicon content of the metal from the acid-lined cupola was 1.66 per cent, but the same charges yielded a silicon content of an average of 0.56 per cent in the basic furnace.

In view of the success in obtaining desulphurization, which on these figures was 78 per cent effective, Heiken eventually changed over all the cupolas in the plant to basic linings, using, instead of magnesite bricks, a rammed lining of dolomite bonded with anhydrous tar. The results continued to be satisfactory, but with increased furnace output and with increasing steel scrap and decreasing hematite pig iron in the charges, the sulphur content of the molten metal showed an increase, although it remained within permissible limits. Heiken noted that the

increase in sulphur corresponded with a decrease in the amount of silicon charged (*i.e.*, with a reduced amount of hematite in the charges).

The effect of adding silicon in the form of 12 per cent ferrosilicon was examined. Using charges of 88 per cent steel scrap and 12 per cent of ferrosilicon, a considerable increase in the sulphur content of the metal was found to occur. This was attributed to heavy oxidation of silicon when charged in this concentrated form, which caused a decrease in the basicity of the slag.

Less Danger of Oxidation

When the required silicon content of the charges was obtained by the use of pig iron, there was less danger of oxidation taking place. To support the view that oxidation reduced the efficiency of the desulphurization, Heiken showed that the sulphur content of the metal increased slightly during the blowing down period as the cupola emptied. This effect was noted even when using 50/50 mixtures of pig iron and steel scrap.

The high pick up of carbon experienced in the experimental melts in the small cupola was confirmed in normal production. With charges containing 50 per cent steel scrap, carbons of 3.85-4.37 per cent were obtained. When charges containing no steel were melted, large quantities of kish graphite were thrown out by the molten metal on cooling.

The sulphur content of the metal produced from charges containing 50 per cent steel scrap was generally below 0.02 per cent, rising to slightly over 0.03 per cent in the last metal tapped. With a manganese content charged of 1.22 per cent, the molten metal contained about 1.0 per cent manganese.

Wear on Linings

Heavy wear on the linings was experienced, but this was of assistance in maintaining a highly basic slag. By taking suitable precautions it was possible to prolong the life of linings in cupolas of 30-36-in. diameter to enable melts of approximately 45 tons to be obtained. The lining had to be rammed to its original size after each day's melt.

Because of the height of the cupolas, receivers could not be used, and the metal was collected in the well, each converter charge being tapped out in portions. It was considered that the use of a receiver would have enabled the metal to be held in contact with the slag for longer periods, and yielded more uniform and complete desulphurization with a longer lining life.

Use of Stabilized Dolomite as a Lining and Patching Material

Experience has been obtained with monolithic linings prepared from dolomite clinker and using the special patching material for repairs. The main points arising in connection with the use of these materials are shown in Table 1.

Installation of the Monolithic Lining

The basic lining should have a thickness of 9 in., and should extend from the bottom of the shell to a height of at least 4 ft. 6 in. above the tuyeres. If the cupola is normally provided with a lining more than 9 in. thick, the additional thickness in excess of 12 in. may be made up with acid refractory.

The stabilized dolomite lining material is mixed with 6 per cent water and 1 per cent liquid sodium silicate in a small pan mill, the sodium silicate being previously dissolved in the water. The optimum charge is 448-560 lb. and this takes about 5 min. to mix. In this way, a suitable quantity of mix becomes available for ramming. It has been found convenient to add 8-9 per cent water in the first instance, and to reduce to 7 per cent by additions of the dry material.

The actual ramming is then carried out at a moisture content of approximately 6 per cent. The lining former, which should preferably be sectional, is inserted, and a course of firebrick is placed inside the bottom plate round the bottom of the former to provide a solid foundation for the ramming. Pneumatic rammers with large flat heads appear to

Table 1

PROPERTIES OF STABILIZED DOLOMITE MATERIALS

A.—*Stabilized Dolomite Ramming Material. Sieve Analysis.*

B.S.S. screens	+7	−7 +25	−25 +72	−72 +150	−150
	Nil	30	30	15	25

Chemical Analysis (Typical Sample)

Loss on Ignition	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO
Nil.....	21.34	3.15	2.20	35.30	38.19

Packing Density, lb. per cu. ft.

(a) Dry 153 lb. per cu. ft. *(b)* 6 per cent Water 147 lb. per cu. ft.

Dried Strength (after 24 hr. air drying).—Circa. 150 psi.
Strength at Elevated Temperature.—Briquette held for 1 hr. at 2012° F. under load of 100 psi. is unaffected.
Thermal Expansion (68 to 1832° F.).—1.5 per cent.
Refractoriness.—3272° F.
Thermal Conductivity.—Mean Temperature, 1292° F. 7.5 Btu. per sq. ft./in./hr./°F.

B.—*Stabilized Dolomite Patching Material. Sieve Analysis.*

B.S.S. screens	−25 +72	−72 +150	−150
	15	25	60

17 to 18 per cent water necessary for plastic consistency.
Air setting period, 4 hr. Drying shrinkage, 1.0 per cent.
Refractoriness, 3146° F.

C.—*Stabilized Dolomite Bricks. Chemical Analysis (Typical Sample).*

SiO_2	Fe_2O_3	Al_2O_2	CaO	MgO
15.1	3.2	2.0	39.1	40.6

Hydration Resistance.—Withstands 24 hrs. boiling in water.
Porosity.—20 per cent.
Bulk Density—169 lb. per cu. ft.
Specific Gravity.—3.39.
Cold Crushing Strength (Tested on end).—Over 8,000 psi.
Permeability.—0.10 cgs. units.
After Contraction (2 hours at 2732° F.).—0.4 per cent.
Refractoriness-Under-Load (25 psi. maintained 2 hrs. at 2732° F.).—5.0 per cent subsidence.
Refractoriness-Under-Load (50 psi. Rising temperature).—Initial softening, 2660° F.; Rapid softening, 2750° F.; Failure, 3002° F.
Thermal Expansion (68—1832° F.).—1.3 per cent.
Thermal Conductivity (1292° F. mean).—15.2 Btu. per sq. ft./in./hr./°F.
Specific Heat.—0.25.

be best for carrying out the ramming. Small peg type rammers plough up the material, and leave a loose top layer of 3-4 in., which may dry out in the space of time elapsing between successive mixes, giving a danger of laminations or zones of weakness and high porosity in the lining.

An allowance of ⅛ in. to the foot is made for expansion of the stabilized dolomite (the actual expansion is 1.5 per cent) and an appropriate space is left between the ramming and the shell or the backing firebricks. Asbestos, slag wool and asbestos sheeting can be used for this purpose. The sheeting is used to hold the wool in position as ramming proceeds.

No expansion allowance is made immediately above the tuyeres, and this space is rammed solid for a height of 12 in., then the expansion allowance is continued. If the expansion allowance were continued from the tuyere level, the air blast might circulate behind the lining and disintegrate it. The lining is taken to the top of the combustion zone, and no neutral course is necessary between the top of the lining and the firebrick of the shaft. The bottom is put in with sand, according to normal practice.

The time required for the installation of a lining depends on the facilities available, but the time required for a cupola of 36-in. diameter is of the order of 10 hrs.

Drying

The cupolas, in which the first monolithic basic linings were used, have holes drilled into the shell to facilitate drying. As stabilized dolomite is air setting, a period of air drying is essential, so that the maximum strength may be developed. Experiments have shown that the air drying period should be of the order of 24 hr.

With a lining 9 in. thick, heating by coke or gas is then required for a further 24 hrs., following which the cupola is ready for service. One lining has actually been in use after a total of 12 hrs.' drying. Although no detrimental effects were observed, this practice is not considered advisable.

Patching

The stabilized dolomite material, used for repairs to the lining, is mixed in a pan mill with 18 per cent water. It should be used as quickly as possible, since it also possesses hydraulic setting properties which are accentuated by the fineness of the material.

Lining Life

The life obtainable from a stabilized dolomite monolithic lining is important, because the cost of materials and installation is several times as great as that of a firebrick lining. The information so far available on lining life applies only to cupolas worked in such a way that desulphurization is obtained, *i. e.*, with a minimum of oxidation. Under these conditions a cupola melting metal of ultimate composition T.C. 2.80, Si 1.50 per cent gave a lining life in the combustion and melting zones of 12 to 16 weeks, equivalent to a total metal throughout of 2,240 tons. The lining in the well withstood 26 weeks' operation, during which approximately 4,480 tons of metal were melted.

Under these conditions the consumption of patching material is similar to that of ganister in an acid cupola engaged on similar service, and is of the order of 54 lb. per ton of metal melted. The consumption appears sensitive to the melting rate of the cupola, and it is inadvisable to operate at an output greater than 80 per cent of the maximum obtainable from a given diameter and coke ratio.

Observations on stabilized dolomite linings have shown that, in the combustion zone, there is a cracking and "tendency to flake" of the working face. This may be due to shrinkage spalling or to inadequate expansion allowance, although it is felt that the latter is extremely unlikely.

High Refractoriness

Due to the high refractoriness of the material, only a slight thickness of the lining sinters (¼ to ½ in.), and it is thought that the cracking phenomenon is due to differences in properties between the sintered working face and the back portion of the lining. The lining ultimately fails, apparently due to lack of strength in its back portion.

After a certain period of working, the material appears to lose its intergranular cohesion, particularly in the unsintered area approaching the shell. It is thought that this may be caused, in the first place, by contraction cracks which appear on the working face of the lining almost immediately the cupola is dropped after a day's run.

Each crack may extend through the fused and sintered areas reaching the base material. After patching and subsequent operation, the cracks on the working face are able to fuse over with the patching material, but the cohesion between the grains may have been permanently impaired.

In the well, there is cracking of the working face, but to a less extent than in the combustion zone. It is thought that slag penetration and seasoning of the lining is responsible for this difference. The resistance of the lining to attack by basic cupola slag is very good.

Improving the Life of Stabilized Dolomite Linings

From the results available, it is believed that it will be possible to improve the life of these materials. An attempt is, therefore, being made to develop a more durable lining and a more efficient patching material. It is felt that the difficulties encountered with the combustion zone could be overcome or minimized by attention to the following factors:

(a) Ramming Properties—The grain size is being investigated with a view to obtaining the maximum density, and hence the minimum porosity. A lining rammed with 6 per cent water has a porosity of 27 to 30 per cent. It is thought that this could be reduced, in particular by investigation of grading technique.

The amount of water used for mixing is also important. It has been shown that the density increases with the amount of water used for mixing. The water content is limited by the efficiency of the drying-out process and the plasticity of the material. With proper facilities for drying out, *e.g.*, the use of vent rods through holes drilled into the cupola shell, the troublesome factor is the lack of plasticity, and for this reason the water content is at present limited to 6 per cent. It is suggested that attempts be made to improve the plasticity in order to obtain a more satisfactory ramming and, hence, greater mechanical strength.

(b) Physical Properties—Due to its high refractoriness and the comparatively low temperature of use, the greater part of the lining is not

sintered and has little strength. It is thought that attempts should be made to improve the strength by the use of chemical bonds.

(c) Methods of Allowing for Expansion — This matter is being investigated, as it is felt that the present method of expansion allowance is not entirely satisfactory.

(d) Improvement in Resistance to Slag Attack—It is proposed to study the resistance of these materials to attack by basic slag, iron oxide, coke, ash, etc.

(e) Improvement in Patching Materials — The life of a cupola lining is governed to a considerable degree by the general resistance of the patching material, and it may be that improved service will be obtained by improvements in the patching.

The properties of a satisfactory cupola patching material are: *(a)* Low drying shrinkage; *(b)* low firing shrinkage; *(c)* adequate plasticity for application to the cupola walls; *(d)* refractoriness (although a high refractoriness is necessary, a wide fusion range is required to enable fritting to occur without danger of actual melting); and *(e)* high dry strength for resistance to abrasion before fritting takes place.

Stable dolomite materials have no natural plasticity and, consequently, must be finely ground so that the requisite plasticity may be obtained. Due to the fine grading, the material has a high firing shrinkage. Experiments are in progress to minimize the firing shrinkage without impairing the plasticity. Further experiments are in progress to improve the plasticity of suitably graded, high packing density material by the addition of plastic clay. Alternate patching materials may also be investigated, such as serpentine-stabilized dolomite, serpentine-magnesite mixtures, etc.

Basic Brick Linings

Chrome Magnesite Bricks—In one instance, a basic cupola has been lined with chrome magnesite bricks from the top of the well upwards to a height of 4 ft. 6 in. above the tuyeres. The lining in the well was of stabilized dolomite.

Two courses of bricks were used, making a lining thickness of 9 in. This lining gave excellent results in service and patching consumption using stabilized dolomite patching was of the same order as that with a stabilized dolomite monolithic lining. Details of total life are not available but after daily use for 4 months, the backing layer of brick was still in good condition.

Stabilized Dolomite Bricks — A complete lining of these bricks, the properties of which are detailed in Table 1, has been used, including the well and extending to a height of 4 ft. 6 in. above the tuyeres. An expansion allowance was made between the shell and the first course of bricks, asbestos steam pipe lagging being used to a thickness of ½ inch.

This lining showed an appreciable improvement over rammed stabilized dolomite. Initial erosion was small, being indicated by a 30 per cent reduction of patching material required for the first week's run. By the end of the third week of operation, however, the normal amount of patching material was necessary for repairs and averaged about 56 lb. per ton of metal melted.

There is no evidence to show that the spalling tendency of basic brick has any detrimental effect on the performance of the lining, although cracks immediately develop after the furnace is dropped each day.

Cupola Melting of Ferromanganese

In the manufacture of manganese steel by the converter process, it is usual to melt the ferromanganese in a small cupola or cupolette. The erosion of an acid lining is severe, and even when using firebrick containing 40-42 per cent alumina the wear is such that the lining in the combustion zone requires renewal after a melt of 8 hr.

A monolithic stabilized dolomite lining was installed in the well and combustion zone of a cupolette engaged in this service to ascertain whether an improved life would be obtained and also the effect on manganese loss during melting, which in an acid-lined furnace averages 6.5 per cent.

The cupolette used was of standard type, having a shell diameter of 2 ft. 9 in., lined to 23-in. internal diameter. The rammed basic lining was continued to a height of 3 ft. 6 in. above the tuyeres, from this level to the top of the shell being finished with firebrick. With this practice, there is no danger of the coke and metal charges damaging the friable and unfritted surface of the rammed lining.

Table 2

MANGANESE AND PHOSPHORUS CONTENTS IN BASIC CUPOLA MELTED FERROMANGANESE

Time	*Mn, per cent*	*P, per cent*
8:30 a.m.	77.3	0.19
9:30 a.m.	78.6	0.18
10:30 a.m.	74.6	0.18
11:30 a.m.	77.5	0.20
1:30 p.m.	78.6	0.21
2:30 p.m.	76.9	0.20
3:30 p.m.	78.7	0.18
4:30 p.m.	78.5	0.18

The lining was given 2 days' air drying, followed by a further 2 days' forced drying by gas to bring the temperature up to approximately 1292° F. The drop bottom was made up with stabilized dolomite material, but it was not possible in this instance to utilize this material for making up the breast.

This was made up with ganister to a thickness of about 8 in. The cupolette was then used for a full 8 hr. melt. For the first hour's run, the rate of melting was lower than with an acid lining, the amount of ferromanganese obtained per tap being only 392-448 lb., as against 616-672 lb. in the same period from an acid lining. Three pounds of fine sandstone, walnut size, were introduced per charge as a flux, and after a further 2 hours' run a sufficient quantity of metal was being melted. Therefore, the use of sandstone was discontinued after 2 hr.

After one day's use, an even wear in the well and melting zone of some 1½ in. had taken place, against 3 to 4 in. in a firebrick-lined shell. The lining was repaired, using stabilized dolomite cement. The furnace was then used again for 2 days' full production without dropping the bottom. No fluxes were used at any time during this period. Table 2 shows the manganese and phosphorus contents of the metal at hourly periods on the second day's run.

The results in Table 2 seem to indicate that no appreciable loss of either manganese or phosphorus has occurred, and they are exactly similar with those obtained in daily practice, using a firebrick-lined furnace.

The wear after 2 days' run was

Table 3

COMPOSITION OF SLAGS FROM BASIC CUPOLA

	Pale brown	*Dark brown*
SiO_2	30.80	29.80
FeO	0.52	1.47
CaO	44.04	45.15
MgO	14.00	12.90
Al_2O_3	8.74	6.46
S	1.08	1.00
MnO	0.83	1.43

only slightly in excess of that found in a brick-lined shell after one day's run. The only serious wear was in the well, and this was attributed to the action of the liquid ferromanganese upon the ganister in the breast. The acid slag resulting from this action would be raised and lowered in the well as metal was collected and tapped.

It seems improbable that with the quantities of manganese and carbon present in ferromanganese, any dephosphorization can be obtained and the results at present available show no appreciable difference in manganese loss between acid and basic melting. The possible advantage of a basic-lined cupolette for ferromanganese melting appears to be in the field of a reduced refractory cost, with savings in repair time and labor. Labor costs for lining a shell with firebrick, and for ramming a shell with the basic material are about the same.

Desulphurization

In the conventional acid cupola, it is not possible to increase the basicity of the slag to a point where appreciable desulphurization can be obtained because of the erosive action of such a slag on the lining. Using a basic stabilized dolomite lining, Renshaw[2] has shown how sulphur can be removed during cupola melting by the use of a basic slag.

The cupola, which is fitted with a continuous tapping spout, allows the maintenance of a considerable volume of slag in the well. The drops of molten metal must, of course, pass through this slag before leaving the cupola.

To test the effectiveness of the desulphurization, a variety of different mixtures was melted, ranging from 100 per cent gray iron to charges composed entirely of steel scrap and ferrosilicon. In all cases, the average sulphur content of the molten metal was less than 50 per cent of that expected when melting similar mixtures in an acid furnace.

In the melt when all steel charges were used, the average sulphur content of the molten metal was 0.049 per cent. The limestone charges used in this melt were 7 per cent by weight of the metal charges and 1 per cent of fluorspar was charged with the limestone. Charge coke consumption was 14.3 per cent.

Using charges of 100 per cent cast iron scrap having a sulphur content of 0.120 per cent, the average sulphur content of the molten metal produced from the basic cupola, was 0.056 per cent, *i.e.,* a sulphur reduction of 53 per cent. In each melt, the first metal tapped from the cupola had a higher sulphur content than succeeding taps, due to the fact that at this stage only a small volume of slag was available in the well and temperatures were below normal. A reduction in the volume of slag present in the well later in the melt was found to lead to an increase in the sulphur content of the metal.

The slag produced under conditions of maximum desulphurization had, when cold, a light brown chalky appearance. By overblowing the cupola, thus creating an oxidizing condition, it was found that the sulphur in the metal rose from 0.050 to 0.075 per cent, with a change in the color of the slag to dark brown. Table 3 gives analyses of typical pale brown and dark brown slags.

This process has been put into commercial production, and metal is being regularly produced with a sulphur content 50 per cent lower than was obtained from an acid furnace. When required, final figures between 0.03 and 0.05 per cent sulphur can be obtained. Under these particular conditions of operation, there is no outstanding effect on the elements carbon, silicon and phosphorus, such as were reported by Heiken.

REFERENCES

[1] *"Dolomite Bricks for Use in Steel Works,"* T. Swinden and J. H. Chesters. *Journal Iron and Steel Institute,* 1941, No. 2, Vol. 144.

[2] *"Basic Cupola Process for Desulphurization," Foundry Trade Journal,* Vol. 70, No. 1401, June 24, 1943.

[3] *"Production Results with a Basic Lined Cupola," Die Giesserei,* No. 43 and 44, October 28, 1934; *Foundry Trade Journal,* Vol. 72, No. 1437, March 2, 1944.

(Continued in March *American Foundryman*)

WAR PRODUCTION CONFERENCE

Sponsored by Engineering Societies

ON January 30, 1945, the Engineering Societies in the metropolitan area of New York will hold a 9-Panel Conference on War Production and Future Planning. The panels will operate in three shifts, each panel headed by outstanding engineering and technical experts for the purpose of large scale consultation with manufacturers and their representatives.

The American Foundrymen's Association is represented through members of the Metropolitan Chapter, with J. S. Vanick, International Nickel Co., New York, serving as Chairman of the Program Committee and T. D. Parker, Climax Molybdenum Co., New York, Chairman of the A.F.A. Metropolitan Chapter, working on the Promotion Committee for the Conference.

The metal industries will be represented in two panels. One of these, "The Properties, Composition and Production of Metals for Strong, Lightweight Construction," panel will present the status of new materials available to industry, as follows:

(A) "Low Alloy—High Strength Steels," F. D. Foote, Alloys Development Co., New York.

(B) "Stainless Steels," Russell Franks, Union Carbide & Carbon Research Labs., Niagara Falls, N. Y.

(C) "Aluminum and Related Alloys," T. L. Fritzlen, Reynolds Research, Glen Cove, L. I., N. Y.

(D) "Prospects for Principal Cast Metals," Donald J. Reese, Manufacture and Foundry Products Section, Metallurgical and Conservation Branch, Steel Division, War Production Board, Washington, D. C.

J. S. Vanick is serving this panel as Chairman, and F. P. Peters, "Metals and Alloys," New York, is

the Vice-Chairman. Panel members include:

1. "Wrought Steels," Robt. H. Aborn, U. S. Steel Corp. Labs., Kearny, N. J.

2. "Cast Steels," K. V. Wheeler, American Steel Castings Co., Newark, N. J.

3. "Cast Irons," Donald J. Reese, Chief, Manufacture and Foundry Products Section, Metallurgical and Conservation Branch, Steel Division, W.P.B., Washington, D. C.

4. "Stainless Alloys," L. S. Bergen, Bergen Precision Castings Co., Pleasantville, N. Y.

5. "Copper and Related Alloys," A. J. Phillips, American Smelting & Refining Co., Perth Amboy, N. J.

6. "Aluminum — Magnesium Alloys," R. E. Ward, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J.

The second panel pertaining to the metal industries, "Utilization of Metals and Alloys in Industry with Particular Reference to Transportation," is under the chairmanship of O. B. J. Fraser, International Nickel Co., New York. The subjects to be covered are:

(A) "Railway, Automotive and Aviation Industries," Ernest E. Thum, Editor of "Metal Progress" (American Society for Metals), Cleveland, Ohio, and Chairman of Committee B-2, American Society for Testing Materials.

(B) "Marine Transportation," Paul Field, Superintendent of Development and Research Branch, Central Technical Department, Shipbuilding Division, Bethlehem Steel Co., Quincy, Mass.

(C) "Welding in Industry," Leon C. Bibber, Welding Engineer, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

The following will serve as panel members for the group:

1. "Aluminum and Aluminum Alloys," K. B. Baker, Aluminum Co. of America, Edgewater, N. J.

2. "Copper, Brasses and Bronzes," Sam Tour, Sam Tour & Co., New York.

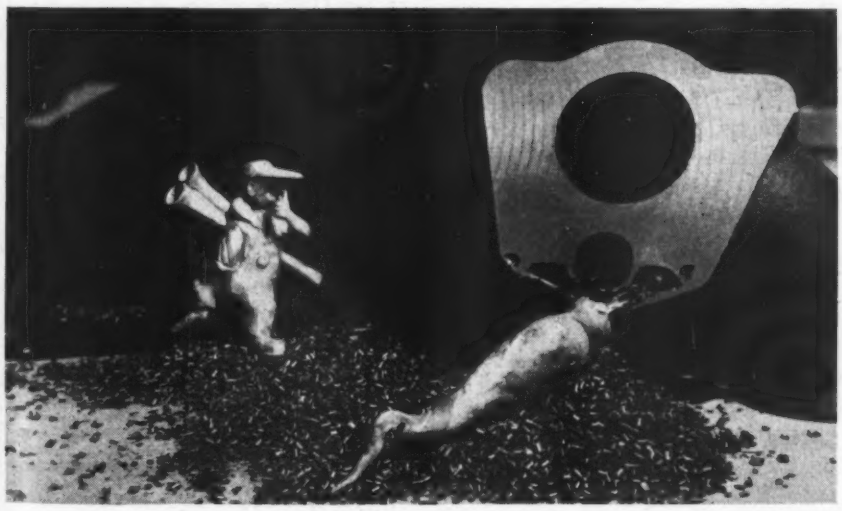
3. "Lead and Lead Alloys, Bearing Metals," G. E. Behr, Research Laboratories, National Lead Co., Brooklyn, N. Y.

4. "Magnesium and Magnesium Alloys," O. E. Grant, Magnesium Div., Dow Chemical Co., New York.

5. "Nickel and Nickel Alloys," W. A. Mudge, International Nickel Co., Inc., New York.

6. "Steels, Plain Carbon, Low Alloy and High Alloy," N. E. Woldman, Eclipse-Pioneer Div., Bendix Aviation Corp., Bendix, N. J.

7. "Zinc and Zinc Alloys," R. G. Kenly, Metal Div., New Jersey Zinc Co., New York.



This "Carvtoon" from a recent issue of the "Invader Exhaust," the house organ of the Hall-Scott Motor Car Co., Berkeley, Calif., was sent to the AMERICAN FOUNDRYMAN by Geo. L. Kennard, Secretary-Treasurer of the Northern California Chapter. The subject is the wood-hacked character Plez Chapman, co-discoverer of "termitus ferricasticus," the cast iron termite. Armed with a rare pistol and termite bazooka gun, Plez is sneaking up on the marauder, as it relentlessly drills into a manifold elbow. Whether Plez made the kill or not, is purely a matter of speculation!

Malleable Founders' Society Publishes New Handbook

FULL discussion of malleable iron, from its chemistry, metallurgy, and manufacture to its applications in various fields, is offered in *"American Malleable Iron,"* a handbook, publication of the Malleable Founders' Society, Cleveland.

In preparation during the past two years, the volume brings together complete data on present manufacturing procedures and most recent standards and practices. It is, therefore, expected to fill a serious need for dependable information on the product, a need which has been intensified in recent years through the widening adoption of malleable iron as a primary specification in many new applications.

Chapters on casting design, pattern design, and machining practice are included in the volume and offer a store of practical data which will be of direct usefulness to designing engineers and production men. The material composing these chapters is drawn entirely from the working practices found to be most efficient by modern manufacturers of malleable iron.

Physical, mechanical, and engineering properties of standard, pearlitic and alloyed malleables are set forth in other portions of the volume and correlated with requirements for the product as set up by the A.S.T.M., the Army and Navy, and other agencies responsible for current specifications. The metallurgy of malleable iron is the subject of a chapter which is unusual in the simplicity with which it explains a complicated process.

A large section is devoted to engineering tables and data, including a tabular summary of A.I.S.I., S.A.E., and N.E. steels and irons of comparable characteristics, which should be valuable as ready reference material in production routine.

Other data of similar practical usefulness are tables of feeds and speeds for drilling, milling, and turning included in the chapter on machining practice, and a group of "design kinks" in the chapter on casting design, which illustrate and explain a number of ingenious and efficient shortcuts in design made possible by malleable iron's combination of properties.

TECH. DEVELOPMENT PROGRAM

Meeting Held by Advisory Committee

ON January 18, the first meeting of the Advisory Committee, Technical Development Program, was held in the Palmer House, Chicago. This Committee, appointed by the Board of Directors, is the body which governs the activities of the Technical Development Program. Membership of the Committee is as follows:

S. V. Wood, *Chairman,* President and Manager, Minneapolis Electric Steel Casting Co., Minneapolis; W. L. Woody, *Vice-Chairman,* Vice-President in Charge of Operations, National Malleable & Steel Castings Co., Cleveland; Dr. D. Basch, Consultant on Materials and Processes, General Electric Co., Schenectady, N. Y.; H. Bornstein, Director, Testing & Research Labs., Deere & Co., Moline, Ill.; G. K. Dreher, Vice-President in Charge of Manufacturing, Ampco Metal, Inc., Milwaukee, Wis.; C. J. Freund, Dean, College of Engineering, University of Detroit, Detroit; Max Kuniansky, Vice-President and General Manager, Lynchburg Foundry Co., Lynchburg, Va.; J. H. Lansing, Consulting Engineer, Malleable Founders' Society, Cleveland; F. A. Melmoth, Vice-President Detroit Steel Casting Co., Detroit; and H. S. Simpson, Chairman of Board, National Engineering Co., Chicago.

Publications

The meeting was called to order by Chairman Wood, and its first consideration was the scope of the program and, further, how the program can best be carried out. The meeting was primarily for the purpose of laying policies for the future activities of the committee. After thorough review, the committee unanimously approved the basic program, and following a report of the Director, approved the work that had been done thus far.

It was the consensus of opinion of members of the Committee that one of the main functions of the Technical Development Program would be the correlation and dissemination of information to members through special publications. It was also the consensus of opinion among committee members that the Technical Development Program should adopt a long-range publication program for that purpose, such a program having already been in force by your Association.

Sponsor New Project

Following review of the investigational activities, Dr. Basch presented for consideration a project recommended by the Committee on Centrifugal Castings, Aluminum and Magnesium Div., of which he is Chairman. The work that this committee is doing is a confirmatory investigation of the process from data now at hand. If these findings can be confirmed, it will mean that another process will be available to the light metal castings industry in the post-war era.

Work now is being conducted among members of the committee, and Dr. Basch stated that the committee would like the Advisory Committee, Technical Development Program, to act as a board of review for the investigation and preliminary work. Also, if, in the opinion of the Committee, further investigation is believed necessary to establish the process, Dr. Basch suggested that the Technical Development Program sponsor and administer such research and necessary funds raised from interested parties to bring the work to a successful conclusion. After thorough discussion, the Advisory Committee accepted the responsibility of reviewing the work done by the Committee on centrifugal castings and the sponsorship of such research and administration of fund, if additional work appears warranted.

Library Facilities

Following a discussion of the function which a library in the National Office could perform, the Committee voted to establish a library service out of the funds at present available from the Technical Development Program.

Investigations

Investigational activities with which the Technical Development Program is now charged were reviewed thoroughly, and the policy regarding the fields of investigation in which the Technical Development Program was to engage, were authorized as those fields in which the American Foundrymen's Association has functioned for a number of years.

Educational Activities

In discussing the educational activities, it was the consensus of opinion of the Advisory Committee that the educational phase of the Technical Development Program, both without and within the industry, was one of its most important functions. It recommended that proper staff be obtained to carry on this program with educational institutions to the end that the foundry industry might become more generally recognized in such institutions, and that men with a technical education might be attracted to the industry.

Following the meeting, members expressed the opinion that the meeting, in their estimation, had definitely laid a solid foundation for the future activities of the Technical Development Program.

A New A.F.A. Publication . . .

Recommended Practices for NON-FERROUS ALLOYS

Information contained in this important New A.F.A. publication has been compiled by the Recommended Practices Committee of the A.F.A. Brass and Bronze Division, and the Committees on Sand Casting of the A.F.A. Aluminum and Magnesium Division. A book that provides non-ferrous foundrymen with accurate, up-to-date data for the production of practically any non-ferrous alloy casting, and enables them to check present production practices against accepted standards and wide experience. An indispensable reference work wherever nonferrous metals are cast . . . compiled by many leading foundrymen and metallurgists. Contains 159 pages, 42 tables, 35 illustrations; cloth bound.

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PRACTICAL APPLICATION AND THEORY
of Gating and Risering Practices
IN MOLDING NON-FERROUS CASTINGS

• This article, reprinted from the November, 1944, issue of "Canadian Metals and Metallurgy," discusses the fundamentals of correct gating and risering so that they may be applied when casting alloys of copper, tin, lead and zinc which naturally are prone to shrinkage.

By
A. C Boak,
Ottawa, Canada

THE principles of correct gating and risering are probably best illustrated in one type of casting which is very common to all non-ferrous foundries, and that is the production of a solid stick of bronze 12 in. or so in length and with a diameter of 2 in. or more.

For the purpose of this discussion, we will consider the alloy to be cast as one containing copper as the base metal and with the addition of tin, lead and zinc as the alloying elements. With such an alloy it is possible with correct methods of melting, alloying and deoxidation to produce a metal which may be dropped a considerable height without the formation of a harmful amount of dross, such as is encountered with the copper-base alloys containing aluminum and to which group belong the aluminum and manganese bronzes.

Bottom Gating

It is quite possible and feasible, to say the least, to cast solid sticks of bronze with the casting molded in a horizontal position. However, most foundrymen prefer to cast them in a vertical position, when the diameter of the stick is 2 in. or more. Another great preference is to gate the stick at the bottom and to place a riser on the top of the stick, as shown in Fig. 1.

With the type of riser and gating from the bottom, as illustrated in Fig. 1, the foundryman may or may not be surprised to learn that he has created a casting which, when the riser is removed, will be found to contain a large area of porosity due to shrinkage, which he may decide either to repair by burning in additional metal or to ship the casting and pray that it meets with his customer's approval.

The method shown in Fig. 1 is entirely contrary to the first principles of feeding, whereas the principle of gating at the bottom of a casting may be considered sound since the metal rises against a head of metal and, therefore, with little turbulence. This statement may be confusing to the average foundryman and, consequently, it must be analyzed further.

While it may be true that bottom gating produces less turbulence in the mold, this system is open to argument since all the metal in the casting must flow through one small opening and there is always the danger of washing sand into the casting, together with whatever dross and other dirt may be created during the pouring. This dross or dirt may or may not rise sufficiently to be carried into the riser and ten chances to one it will be found entrapped in the length of the casting.

Such troubles may be overcome by the use of a dry sand sprue or by some method of keeping the sprue full during pouring such as by means of strainer cores, choke gates, etc. The casting illustrated in Fig. 1, therefore, may be found to be entirely free from dross, sand wash or dirt and yet to the metallurgist it is entirely unsound.

Pouring Temperature

It is unsound first, because the riser is too small; second, because the metal in the riser is the coldest metal of the casting. This is due to the fact that the first metal to enter the mold is forced upward as the mold is filled and at the end of the pour the hottest metal is in the bottom of the casting and therefore will be the last to solidify. Furthermore, we can expect little help from the chilling effect of the molding sand in a casting of this size and solidification is, therefore, slow and prolonged.

The pouring temperature of a casting made in the manner of Fig. 1 will greatly influence the extent of the shrinkage areas. If the casting is poured cold, say at 1950° F. the shrinkage and defective areas will be much more pronounced than if we pour the casting at 2250° F.

This is explained by the fact that the metal will dry and heat the sand to such an extent that it insulates the metal in the casting and riser and solidification, therefore, takes place more slowly. This allows the metal in the riser to be more effective as a feeding head and reduces the shrinkage areas. However, a casting of this size and weight poured at 2250° F. will result in one that is extremely rough and difficult to clean since penetration into the sand, cracks and swells of the mold may be severe.

Sacrifice of Properties

The crystal size of a casting poured at this high temperature will be very large and the strength will be correspondingly reduced. The method of pouring hot and gating from the bottom has long been practiced in the casting of high lead bronzes since the resultant relatively porous castings are found to have superior bearing qualities, but naturally there is a sacrifice of the tensile and other physical properties of the castings.

This drop in the physical properties may be dangerous in heavily loaded bearings and may well cause premature failure. It should, therefore, be the aim of all foundrymen to produce castings that are as solid as it is possible to produce them and with the highest possible physical properties, and the reduction in bearing qualities will be found to be insignificant in comparison with

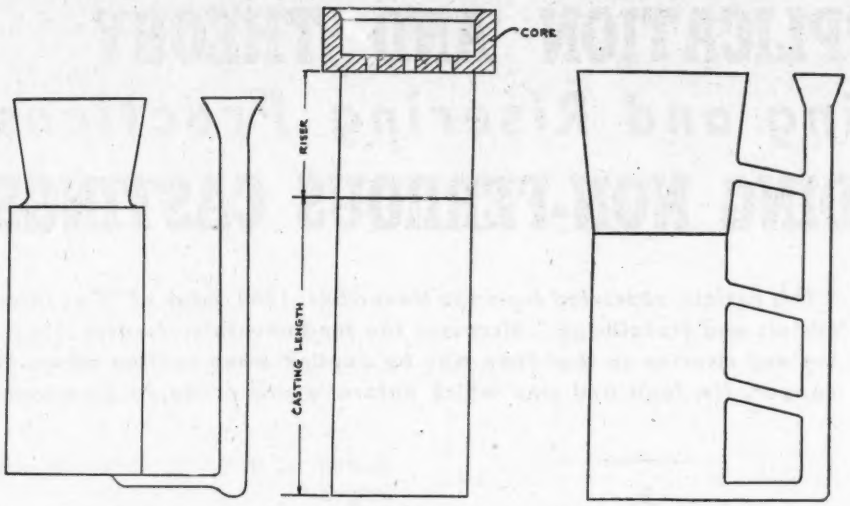


Fig. 1 Fig. 2 Fig. 3

Fig. 1—Gating the stick at the bottom, with riser at the top. Fig. 2—Basin strainer core placed over the riser in top pouring method. Fig. 3—Modification of Fig. 1, showing improved conditions for progressive solidification, but increasing the molding time.

the increase in the load deformation property of the casting.

Hottest Metal in Riser

The problem of casting a solid brick or bar of bronze thus evolves around the fact that it is absolutely necessary to make the bar in such a manner that the hottest metal in the mold is in the riser. Some foundrymen produce fairly solid sticks by allowing the mold to fill until the metal just rises in the riser, and then add hot metal to the riser from a pot of metal separately prepared for the purpose.

It should be obvious that this method only partially overcomes the difficulty since there will be hot metal at the bottom of the casting separated from the hot metal in the riser by a volume of colder metal at the top part of the casting. Thus, an area of porosity may still exist in the lower sections of the casting after solidification is completed. To overcome the difficulty completely and to achieve ideal progressive solidification which commences from the bottom of the casting and proceeds to the top of the riser, it is necessary to pour the casting in such a manner that the conditions found when the casting is molded in the manner of Fig. 1 will be reversed.

Top Pouring of Castings

The obvious answer to the problem is to pour the casting from the top and through the riser rather than to gate the casting from the bottom. To the foundryman who has been brought up to believe that the only way to make sound, clean bronze castings is to gate them from the bottom, this method may appear very drastic. However, "the proof of the pudding is in the eating," and certain types of castings, such as the one under discussion, lend themselves to the adoption of top pouring.

At the beginning of this article the author mentioned the fact that we would consider only the alloys of copper, tin, lead and zinc since, with these alloys, it is a simple matter to produce a molten alloy which may be dropped a considerable height without the formation of an objectionable amount of dross.

Suitable Alloys

The bronzes and red brasses, therefore, are suitable alloys for the top pouring method of making castings. Silicon bronze also may be cast successfully and some castings in manganese bronze have been produced by the top pouring method where the section was such that the dross was found to rise out of the casting into the riser or it could be machined off.

The method of molding a bar or stick of bronze by the top pouring method is illustrated in Fig. 2. A strainer at the bottom of a green sand cup or a basin strainer core is placed on top of the mold over the riser. The number and size of the holes in the strainer core will vary with the size of the casting to be made but, generally speaking, 3/8-in. diameter holes will be found to be sufficiently large. Obviously, it is advantageous to have the holes small and few enough in number to permit one to keep the pouring basin full during the pouring cycle and thus allow any dross or dirt to float on the surface of the metal in the basin.

Sand Wash

An objection to the top pouring method might be raised by some who believe that the sand at the bottom of the mold might wash. The answer to this objection would be to make the mold from dry sand and to place a flat core at the bottom of the casting. However, the author believes this to be unnecessary and in most cases a green sand mold may be used without any difficulty from this source.

This contention is based upon the fact that there is less possibility of sand wash with the top pouring than with the bottom pouring method since in the bottom pouring method all the metal must enter the mold through one or two gates whereas with the top pouring method a cushion of metal is soon formed at the bottom of the mold which takes the shock and thus prevents any sand wash.

The difficulties that might be encountered will be from entrapped air and the formation of dross. The entrapped air will be liberated and float to the top of the mold if the pouring temperature is correct and the dross forming conditions may be taken care of by the addition to the metal of a sufficient quantity of deoxidizer such as phosphor copper before pouring the casting.

The top pouring method permits of a much lower pouring temperature than with bottom pouring and thus produces a cleaner casting with a minimum penetration into the sand. Consequently, cleaning costs will be lowered and a higher yield obtained by the elimination of the usual sprues and gates.

Modified Bottom Pouring

For those foundrymen who would not like to adopt such a radical change in their molding methods, it might be well to point out that the bottom pouring method may be made to approximate the ideal solidification conditions provided by the top pouring method by the system of gating as illustrated in Fig. 3. Such a method of gating will disturb the conditions set up by the simple bottom pour illustrated by Fig. 1

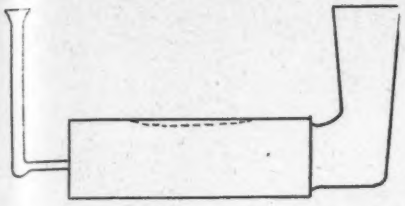


Fig. 4—Dotted line indicates depression in a casting that is usually porous, resulting from a riser that is too small or from metal in the riser being colder than the metal in the casting.

and will provide hot metal for the riser and conditions for progressive solidifications will be generally improved. However, the disadvantages are that the molding time will be increased, due to the necessity of cutting numerous gates with a subsequent increase in cleaning costs and a decrease in yield.

The principle of top pouring is not new and has been known among foundrymen for many years under the name of pop or pencil gates, or popping the metal into the mold, and is practiced extensively in cast iron founding.

However, the addition of pouring or popping castings through a riser as a means of producing sounder non-ferrous castings is a recent development and much of the credit for this advancement is due to the efforts of C. Brisbois and A. E. Cartwright[1]. Since their excellent paper was published, other investigators have found that the method works and, when the conventional methods fail, very often the top pouring method is found to be the answer.

Application of Top Pouring

The author does not wish to create the impression that the top pouring method is only applicable to the casting of solid sticks, but on the contrary it is found to be useful in the production of most cored or solid castings, requiring the use of risers and for the castings which are found to be difficult to feed when gating is done by the conventional bottom pouring methods.

Horizontal Casting

In the second paragraph of this article, the author mentioned the fact that it is quite feasible to cast solid sticks of bronze molded in the horizontal position. In fact, it does not matter in what position a casting is molded provided the first principles of feeding are observed and progressive solidification is attained.

When a solid stick of bronze is cast in the horizontal position, the mistakes that are common to failure are usually that the foundryman does not make the riser large enough, or the metal in the riser is colder than the metal in the casting.

Depression in Casting

To illustrate these points a common method of gating and risering is shown in Fig. 4 and the result that is obtained is illustrated by the dotted line. On machining a casting which exhibits a depression of the type shown, the casting will be found to be generally porous and to lack the usual physical properties.

The correct method of producing sound sticks in the horizontal position is shown in Fig. 5. Separate risers for each casting may be used, but it is possible and advantageous to combine the two and thus make a saving in metal. On examining the method of gating and risering in Fig. 5 we readily see that the metal in the riser will be hotter than the metal in the casting and progressive solidification will be achieved.

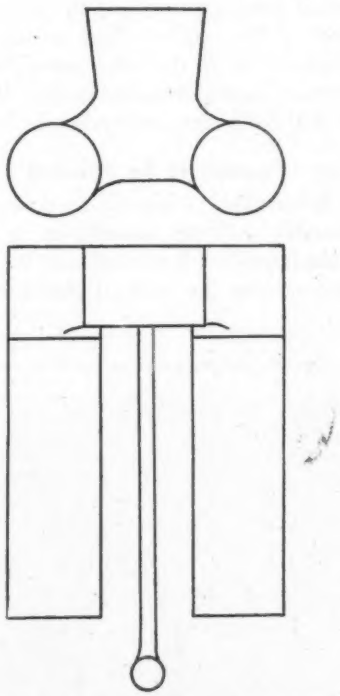


Fig. 5—Adaptation of system of gating, showing the principle to be in accord with the fundamentals of feeding and progressive solidification.

The method of gating the sticks in Fig. 5 is an adaptation of a very important system of gating which may be termed the riser gate. In this system it is customary to use a secondary or pouring sprue connected to the riser by means of a thin or skim gate. The riser is, in turn, connected to the casting by means of a heavy gate.

Progressive Solidification

It is important to see that this gate is large enough to be certain that the casting does not become shut off from the riser before solidification takes place. This method merits attention since it is adaptable to many types of castings and allows one to mold in a horizontal position without the necessity of turning molds on end.

One could cite many examples of castings with sketches of how they should and how they should not be gated but in the final analysis success would only be found when the casting has been gated properly and fed with risers that permit progressive solidification to take place. The author has used the solid stick as an example, since it is common to practically all foundries and the principles expounded here may easily be adapted to the production of most types of castings.

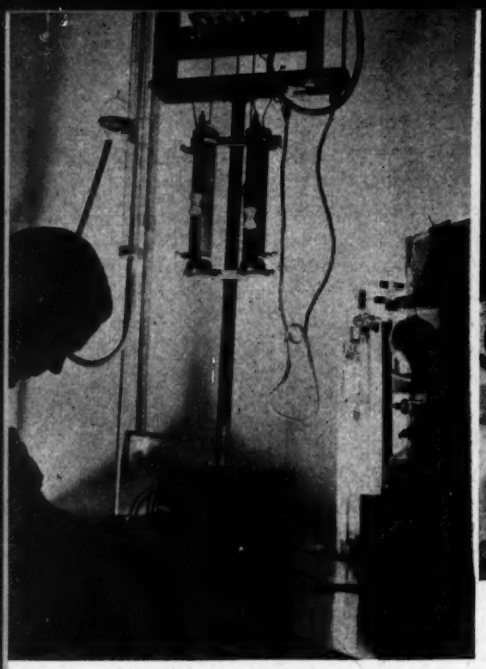
Failure from Shrinkage

In conclusion, it should be remembered that the alloys of copper, tin, lead and zinc are prone to shrink and, unless the fundamentals of gating and risering are appreciated and understood then failures from shrinkage will result. It sometimes happens that the foundryman is fortunate enough to work with castings of light section and proper design so that all it is necessary for him to do is to attach a simple gate and to forget about the vagaries of risers.

Correct Principle

Unfortunately, this happy situation is rarely found and recourse to the use of risers and sometimes chills is the only way to overcome the difficulty and to produce sound castings. The top pouring method is one way to overcome many a problem casting and its best recommendation is that its principle is in accordance with the fundamentals of feeding and progressive solidification.

[1] Brisbois, C., and Cartwright, A. E. *"Risers or Gates for Some Special Non-Ferrous and Alloyed and High Test Iron Castings,"* TRANSACTIONS, American Foundrymen's Association, vol. 46, pp. 219-256 (1938).



Left: Laboratory attendant analyzes metal for dissolved gases. Above: Precision heat treating of Lancaster bomber parts.

Canada Expands METALLURGICAL RESEARCH

SINCE keeping pace with the enemy in technical developments is of vital importance to Allied Victory, all departments of Canada's new Physical Metallurgical Research Laboratories, Bureau of Mines, at Ottawa, have been waging the war of metals.

The Laboratories are the Canadian equivalent of the physical metallurgy research laboratories of the National Physical Laboratory, Teddington, England, and of the United States Bureau of Standards, Washington, D. C.

They are a collection of many laboratories. In the industrial laboratories, metal is melted and poured into ingots or castings. Forging, rolling, extruding, die casting, welding and heat treatment are carried out in the same manner that industry operates, except that in these laboratories every detail is under the watchful eyes of the metal scientists who observe the effect of experiments designed to improve industrial practice.

In the mechanical laboratory metal is subjected to vibration, tension, impact, compression and torsion, and the reaction of all kinds of mechnical strains is observed.

In the physical laboratory the electrical and thermal properties of the metal are measured, as in the reaction of the steel to heat treatment. Likewise, in all the other laboratories every available instrument is at hand to probe into the properties of metals.

Foundry to Be Included

A complete, scientifically equipped foundry will be established in the Laboratories. Research will be carried out on the general problems of the effect of molding materials on castings, of melting procedure on castings and of changes in alloy composition.

A laboratory for research on molding materials is being set up at the present time. Molding machines, sand mixers, core ovens, sand testing instruments and all the tools of the foundry trade will be used in order to conduct adequate foundry research.

It is intended that the Physical Metallurgical Research Laboratories shall continue after the war, to carry out ordnance research for the Canadian Army, Navy and Air Force, as well as research on post-war metallurgical problems for the various Canadian industries.

The Bureau of Mines Laboratories, Ottawa, Canada, where research work is carried out on minerals, fuels and finished metal.

WESTERN NEW YORK CHAPTER

Aids Foundry Courses in Gov't Program

TWO members of the Western New York Chapter are instructing two foundry courses, sponsored by the Engineering, Science and Management War Training Program of the U. S. Government. Each of 16 weeks' duration, the tuition-free courses will be held at the University of Buffalo, at Buffalo.

Open to all ambitious men who wish to broaden their knowledge of foundry practice, and the production, design and use of castings, the meetings will be held one evening each week from 8:15 to 10:15 p.m.

Monday evenings, beginning January 29, will be devoted to "Modern Foundry Practice," given by Jas. L. Yates, Worthington Pump & Machinery Corp., Buffalo. On Tuesday evenings, beginning January 30, H. C. Winte, also of the Worthington Pump & Machinery Corp., will give a course in "Ferrous Foundry Metallurgy."

Outlines of the programs for the two courses are given in the accompanying box.

"MODERN FOUNDRY PRACTICE"

Monday Evenings, Starting January 29, 1945

1. Review of Foundry Fundamentals
2. Engineering Design for Cast Products in Metal
3. Foundry Materials
4. Patterns and Pattern Making
5. Core Making and Core Making Equipment
6. Sand Preparing and Control Equipment; Sand Testing
7. Sand Handling and Distributing Equipment
8. Molding and Molding Machinery
9. Melting Means and Practices
10. Casting Cleaning and Cleaning Equipment
11. Special Irons and Heat Treatment
12. Foundry Layout
13. Foundry Sanitation
    - (a) Dust Control
    - (b) Industrial Code Rule No. 10
14. Practices and Equipment
    - (a) The Jobbing Foundry
    - (b) The Semi-Production Foundry
    - (c) The Large Production Foundry
15. Centrifugal Casting
    - (a) Types, Methods and Equipment
    - (b) The Investment Molding Process
16. General Summary

"FERROUS FOUNDRY METALLURGY"

Tuesday Evenings, Starting January 30, 1945

1. Introduction
   Testing Methods
2. Design
3. Molding Methods
   Casting Defects
4. General Microstructure
5. Iron and Carbon
6. Malleable Iron
   - (a) General Information
   - (b) Metallurgical Features
   - (c) Methods of Manufacture
7. Malleable Iron
   - (a) Properties of Malleable Iron
   - (b) Properties of Cupola Malleable Iron
   - (c) Properties of Alloy Malleable Iron
8. Cast Steel
   - (a) General Information
   - (b) Methods of Manufacture
   - (c) Metallurgical Features
9. Cast Steel
   - (a) Recommendations for Design
   - (b) Properties and Application of Carbon Cast Steel
   - (c) Properties and Application of Low Alloy Cast Steel
10. Cast Steel
    - (a) Properties and Application of High Alloy Cast Steel
    - (b) Heat Treatment of Cast Steel
11. Cast Iron
    - (a) General Information
    - (b) Methods of Manufacture
    - (c) Effect of Carbon and Silicon
12. Cast Iron
    - (a) Effect of Manganese, Sulphur and Phosphorus
    - (b) Effect of Nickel, Chromium
13. Cast Iron
    - (a) Effect of Other Elements
14. Cast Iron
    - (a) Effect of Gases
    - (b) Effect of Inoculation
15. Cast Iron
    - (a) Superheating
    - (b) Pouring and Cooling Rates
    - (c) Heat Treatment
16. Cast Iron
    - (a) General Engineering Properties
    - (b) Static Strength and Elasticity
    - (c) Dynamic Strength and Elasticity
    - (d) Machinability and Wear

DR. H. A. SCHWARTZ
Is Third A.F.A. Foundation Lecturer

IT WAS at the 47th Annual Meeting of the American Foundrymen's Association, in St. Louis, that the Annual A.F.A. Foundation Lecture was inaugurated. John W. Bolton, The Lunkenheimer Co., Cincinnati, presented the first lecture, "Foundry Metallurgy in the Castings Industry."

Last year, in Buffalo, Dr. H. W. Gillett, Battelle Memorial Institute, Columbus, Ohio, had the honor of presenting the second Foundation Lecture, "Cupola Raw Materials."

In line with the policy of the A.F.A. Lecture Committee, which selects outstanding foundry technologists for this Annual Foundation Lecture, Dr. H. A. Schwartz is this year's choice.

Dr. Schwartz, a world-wide authority on malleable iron, is known to foundrymen everywhere for his many papers presented before meetings of technical societies, his articles in the trade press, and his book on "American Malleable Cast Iron."

For his many technical and scientific contributions to the foundry industry, Dr. Schwartz was awarded the John A. Penton Gold Medal of the American Foundrymen's Association in 1930, and in 1939 he was honored with the E. J. Fox Gold Medal of the Institute of British Foundrymen.

A native of Oldham County, Kentucky, Dr. Schwartz received his technical education at Rose Polytechnic Institute, Terre Haute, Ind., receiving his B.S. degree in 1901, M.S. in 1903, and the degree of Mechanical Engineer in 1905. He was recently honored by this institution with the degree of Ph.D.

Dr. H. A. Schwartz

From 1902 to 1920, Dr. Schwartz was connected with the National Malleable Castings Co. in Indianapolis, as draftsman, chemist, metallurgist, and assistant superintendent. In 1920, he was made director of research for the entire corporation, now known as the National Malleable & Steel Castings Co., with headquarters at Cleveland. During recent years, Dr. Schwartz has been doing research work on alloy steels, especially in connection with the production of wear and oxidation resistant materials.

In addition to his membership in the American Foundrymen's Association, Dr. Schwartz is a member of the American Society for Metals, American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, Society for Automotive Engineers, and Iron and Steel Institute (British). He has served on many committees and has been active in the development of the above societies.

Malleable Symposium Ready for Mailing

THE newest A.F.A. publication, "Symposium on Gating and Heading Malleable Iron Castings," is compiled of articles which were presented at the 3rd War Production Foundry Congress, augmented by a paper from the 1st War Production Foundry Congress.

The material is bound into one 83-page book, with paper covers, for easy reference purposes. It is available to A.F.A. members for $1.50 per copy.

Each of the seven articles included in the symposium is prepared by outstanding authorities in the malleable field. The papers are: "Gating and Feeding Malleable Pipe Fittings," by M. L. Hawkins; "Heading and Gating of Malleable Iron Castings," by A. J. Klimek; "Gating and Heading," by C. C. Lawson; "Gating and Feeding of Malleable Iron Castings," by A. T. Jeffery; "Gating Malleable Castings," by D. J. Dobson; "Heading and Gating Malleable Castings," by E. F. Waterbor; and "Gating Malleable and Arma Steel Castings," by F. E. Reeves.

I.B.F. Names Authors Of Exchange Paper

WORD has been received from John Bolton, Acting Secretary of the Institute of British Foundrymen, that the official 1945 Exchange Paper for the A.F.A. is to be prepared by E. A. G. Liddiard and W. A. Baker, of the British Non-Ferrous Metals Research Association.

The paper will deal with the cause and control of microporosity in magnesium alloys. Both authors are outstanding research men in the British light metals field, and their paper should create real interest among foundrymen here.

This exchange of technical papers, originating in 1921 and continuing without interruption since that time, has done much to create good will between foundrymen of the United States and Great Britain. Moreover, this exchange has been a means of promoting a better understanding of the common critical foundry problems existing in these two countries.

Foundry Practice Studied By Local Foreman's Club

THE Foreman's Club of Dayton, Ohio, has set up through an educational committee a series of Educational Classes consisting of various subjects in which the membership is interested.

One of the courses consists of "Foundry Practices." It is a 10 weeks' course, and was started on November 15. The purpose of these educational classes is to permit the members of the foundry group to be versed in up-to-the-minute foundry practices and to discuss their application under various conditions.

On January 24, Cecil E. Bales, Ironton Fire Brick Co., Ironton, Ohio, will give this group an illustrated lecture entitled "Foundry Refractories" at the Parker Vocational High School.

Book Review

Materials Handbook, by George S. Brady. Red cloth bound, 765 pages. Published by McGraw-Hill Book Company, Inc., New York. Price, $5.00.

This is the fifth edition of a valuable book which, over a period of sixteen years, has been revised and expanded until it now includes descriptive, up-to-date data on all kinds of industrial materials. The great number of materials described forbids the exhaustive treatment of any one material. The author has assumed that persons wishing more detailed information will consult producers for detailed specifications.

Statements about characteristics of materials are backed by the most competent authorities in each case, and do not necessarily represent the author's private opinions. Nomenclature is selected by greatest and most reasonable current usage.

WISCONSIN CHAPTER

To Hold 8th Regional Conference

FEATURES at the 8th Annual Regional Foundry Congress, sponsored jointly by the A.F.A. Wisconsin Chapter and the University of Wisconsin, February 8-9, at the Schroeder Hotel, Milwaukee, will be Apprentice Training, Core Blowing Demonstration, Application of X-Ray in the Foundry, and Centrifugal Casting.

Beginning with the opening address by F. Ellis Johnson, Dean, College of Engineering, University of Wisconsin, Chairmen John Bing, A. P. Green Fire Brick Co., Milwaukee, and Prof. E. R. Shorey, University of Wisconsin, and the two Co-Chairmen, R. C. Woodward, Bucyrus Erie Co., Milwaukee, and R. F. Jordon, Sterling Wheelbarrow Co., Milwaukee, have planned a variety of subjects covering steel, gray iron, malleable and patterns.

In addition, there will be three addresses of general interest. Prof. Don Lescohier, University of Wisconsin, will speak on "Current Wage Problems" at the February 8 luncheon. At the banquet, also on Thursday, Jack H. Lieb, news reel photographer for Metro-Goldwyn-Mayer, will present "From D-Day to Germany." The February 9 luncheon address, "Humanics in the Foundry," will be given by Dr. R. L. Lee, General Motors Corp.

The complete program of the conference appears in the box on this page.

Wisconsin Chapter's 8th Regional Conference

Thursday, February 8

REGISTRATION—9:00 a.m.

OPENING ADDRESS BY DEAN F. ELLIS JOHNSON—10:00-10:30 a.m.

GENERAL MEETING—10:30 a.m.-12:00 noon.

LUNCHEON MEETING—12:00 noon.
Speaker, Prof. Don Lescohier, University of Wisconsin
"Current Wage Problems"

GRAY IRON—2:30-3:30 p.m.
Speaker, Dan Krause, Battelle Memorial Institute
"Metallurgy for Practical Foundrymen"

STEEL AND TECHNICIANS—2:00-3:30 p.m.
"Wear Resistance of Steel Castings"

MALLEABLE—2:00-3:30 p.m.
Speaker, C. H. Martin, Holcroft and Co. and General Electric Co.
"Modern Annealing Equipment"

NON-FERROUS—2:00-3:30 p.m.
Speaker, W. Romanoff, H. Kramer & Co.
"Scrap Clinic"

PATTERN—2:00-3:30 p.m.
(a) "Problems in Purchasing Patterns"
(b) "Apprentice Problems Affecting Pattern Shops"

PATTERN—3:40-5:10 p.m.
"Core Blowing Demonstration"

GRAY IRON—3:40-5:10 p.m.
Speaker, Wm. Hambley, Allis Chalmers Mfg. Co.
"Shrinks and Blows"

STEEL AND TECHNICIANS—3:40-5:10 p.m.
"Heat Treating Steel Castings"

MALLEABLE—3:40-5:10 p.m.
Speaker, C. H. Martin, Holcroft and Co. and General Electric Co.
"Modern Annealing Equipment"

NON-FERROUS—3:40-5:10 p.m.
Speaker, Leon Dicke, Allis-Chalmers Mfg. Co.
"Job Evaluation and Operation Cost"

BANQUET—6:30 p.m.
Speaker, Jack H. Lieb, ace news reel photographer for Metro-Goldwyn-Mayer
"From D-Day to Germany"

Friday, February 9

GRAY IRON—10:00-11:50 a.m.
Speaker, F. G. Sefing, International Nickel Co.
"Study of Molding Methods for Sound Castings"

STEEL—10:00-11:50 a.m.
Speaker, J. A. Gitzen, Delta Oil Products
"Core Binders"

MALLEABLE—10:00-11:50 a.m.
"Methods, Technique, and Coordination of Malleable Melting"

PATTERN—10:00-11:50 a.m.
(a) Pattern and Foundry Gadgets used in connection with pattern equipment to expedite production and produce better castings.
(b) Portable and auxiliary machines used to help check costs in pattern shops.

NON-FERROUS—10:00-11:50 a.m.
General Discussion
"Aluminum and Magnesium Castings"

TECHNICIANS—10:00-11:50 a.m.
Speaker, J. A. Kayser, Laclede-Christy Company
"Properties of Refractories"

LUNCHEON—12:00 noon
Speaker, Dr. R. L. Lee, Department of Public Relations, General Motors Corp.
"Humanics in the Foundry"

TECHNICIANS—2:00-3:30 p.m.
Speaker, Dr. Geo. L. Clark, University of Illinois
"Application of X-Ray Diffraction to the Foundry Industry"

PATTERN—NON-FERROUS—GRAY IRON—2:00-3:30 p.m.
"General Pattern Discussion with Up-to-Date Developments in Design and Casting Problems"

STEEL—2:00-3:30 p.m.
"Precision Castings"

MALLEABLE—2:00-3:30 p.m.
"Efficient Material Flow and Handling in Jobbing Foundries"

GENERAL MEETING—3:40-5:00 p.m.
Committee, Norman Koch, Chairman; L. E. Royt, J. V. Alle, L. J. Andres
"Centrifugal Castings"

Death of Bill Schulte Is Real Loss to A.F.A.

Wm. Schulte

IT WAS at the 1909 Foundry Show in Cincinnati that Bill Schulte first became identified with the foundry industry. He was a youngster of 23 then, employed as foreman for the local contractor who installed air and power lines in the exhibition hall, but his ability and willingness were so obvious to the exhibition manager, C. E. Hoyt, that he prevailed the lad to adopt a foundry career.

Since then Mr. Schulte had a broad and successful career in the industry, including employment with such firms as the Arcade Manufacturing Co., the American Foundry Equipment Co., S. Cheney & Sons, and the National Engineering Co. However, loyal Bill Schulte only accepted the positions he held with the positive provision that he could be free to serve A.F.A. as Superintendent of Installation at the foundry exhibits.

That's why the Association always was able to count on Bill's help during the past 35 years, and much of the fine handling of the many successful foundry exhibits can be attributed to the efforts and ability of big Bill Schulte.

Sudden death, resulting from a fall on ice, ended the foundry career of Mr. Schulte on January 4. In his passing the A.F.A. bids farewell to an ardent worker, and the industry has lost a faithful friend!

Considerations in Igniting Mold and Core Vents

THE Eastern Canada and Newfoundland Chapter believes in having practical information contained in its monthly 4-page bulletins, as indicated by the following item from a recent release, written by E. N. Delahunt, Warden King, Ltd., Montreal:

"With the exception of clay and cement, all the binders used in core sand mixtures are combustible. In contact with, or nearly surrounded by molten metal, the core is raised to a high temperature. The binder material is converted to gas which escapes through the vent passage or passages in great volume.

"In some instances this gas is at a temperature which causes it to burst into flame. In other instances, and these probably are in the majority, the gas emerges in the form of smoke with a very acrid, penetrating and disagreeable odor. Application of a hot skimmer, piece of scrap, torch, handful of oily waste or shavings, causes the smoke to burst into flame with consequent elimination of the smoke and smell.

"In large hollow cores, or cores in which a comparatively thin coating of green sand or loam is swept on to a cast iron or steel barrel, the vent must be lighted immediately after it commences oozing through the vent openings. If allowed to accumulate it unites with the air and forms a highly explosive mixture, bound to be touched off by a falling spark or splash of metal.

"With little or no artificial binder in molding sand and with most of the gas coming from the coal dust in the facing, the necessity of lighting the vent is not a factor of any importance. However, there is one important exception to that statement. Where the escaping gas is confined, for example, under a bottom board, it must be lighted, as with the hollow core, otherwise it will develop into an explosive mixture."

On January 4, 1945, a Veterans' Club, composed of 123 members of the Indiana Harbor Works of the American Steel Foundries, having 25 or more years of service, was organized. The above photograph shows (left to right) Thomas Drever, President of the American Steel Foundries, and J. W. Porter, Indiana Harbor, Works Manager, making presentation of gold service award watches to Miss Mary Alice Thomas of the Accounting Department, 32 years of service, and Oscar F. Turnell, Open Hearth Melter, 50 years of service. A total of 621 such service awards were distributed in the several plants of the company this year.

Committee on Defects Meets in Chicago

A JANUARY meeting of the Committee on Analysis of Casting Defects was held at the A.F.A. Chicago office Saturday, January 20. The discussion was general and centered around the idea of presenting the material to the various chapters so that members would have an opportunity to discuss the work of the committee with the ultimate goal of improving their forthcoming progress report.

Committee members are already scheduled to present some of this material at several of the local chapter meetings.

TWO FOUNDRY COURSES

Conducted in Southern California Area

THE forthcoming series of seven lectures, beginning January 22 and continuing through February 26, to be held at the Edison Bldg., Los Angeles, will include: "Design of Castings," "Casting Processes," "Selection of Cast Alloy," "Cast Steel and Its Heat Treatment," "Cast Iron and Its Heat Treatment," "Cast Aluminum, Copper and Magnesium Alloys and Their Heat Treatment," and "Inspection of Castings."

This lecture course on the design and engineering properties of cast metals is sponsored by the Southern California Chapter, and made possible through the efforts of chapter members and the contributions of foundries in the district, to provide a well rounded program on subjects relating to iron, steel, aluminum, copper and magnesium.

A distinctly separate foundry course, offered in the University of California's War Training Program, is being conducted at Huntington Park, under the direction of A. J. Burgard, Columbia Steel Co. This particular course covers the basic theory of foundry technique, with special emphasis on linking theory to practice.

Through an error, the report of these two courses, made in the January issue of AMERICAN FOUNDRYMAN, indicated that the programs were related, whereas no relationship exists in the sponsorship or subject matter of these entirely separate meetings.

1945 LECTURE SERIES

To Complete Chicago's 4-Year Program

FOUR years ago the Lecture Course Committee of the Chicago Chapter suggested an educational program that would include the several phases of foundry practice. The plan was to provide an opportunity for all connected with the foundry industry, first to broaden their knowledge of subjects outside their daily routine, and second to learn more about the latest and best foundry practice on subjects with which they are daily concerned.

Beginning with the lecture on January 17, the program goes into the final series of lectures included in the program. This season, unlike previous years, the series will include seven sessions, with the final meeting, on April 11, being a lecture and conducted tour through the Technological Institute of Northwestern University.

The lectures will be handled as panel discussions with the different chairmen serving as the leaders for several authoritative speakers. Enrollments are accepted for the entire series, or for individual lectures, in advance of each meeting date.

Reservations should be made to E. H. Pritchard, Western Materials Co., 39 South LaSalle St. ,Chicago 3. All sessions, with the exception of the April 11 inspection tour, will be held in the Auditorium of the Peoples Gas Light and Coke Co. Season tickets cost $1.00 per person. A complete outline of the lecture course appears elsewhere on this page.

War Work Continues with Wooden Bearing

THE resourcefulness of the plant superintendent and acting millwright at the Muncie Malleable Foundry Co., Muncie, Ind., enabled that foundry to continue war production work recently whereas men with less ingenuity would have been forced to discontinue operations.

One morning it was discovered that the top half of one of the bearings on the continuous pug mill, which conditions about 35 tons of sand hourly, was worn to the extent that it was rendered useless. Since there was no spare available, the superintendent contacted the plant millwright, and they decided to make a hardwood bearing that could be used until one made of iron was procured.

The patternmaker immediately went to work and in approximately one hour the wood bearing was fashioned. Only a little more time was required for installation, and soon the unit was running smoothly, making the normal amount of production, or $6,000 worth of castings, possible for that day.

Chicago Chapter's 1945 Foundry Lecture Course

SCHEDULE OF LECTURES

Lecture No. 1—January 17
"Aluminum and Magnesium"

Lecture No. 2—January 30
"Welding Materials and Equipment"

Lecture No. 3—February 14
"Cleaning Methods—Part 1"

Lecture No. 4—February 28
"Cleaning Methods—Part 2"

Lecture No. 5—March 14
"Heat Treatment of Castings"

Lecture No. 6—March 28
"Inspection of Castings"

Lecture No. 7, Special—April 11
Lecture and Conducted Tour Through Technological Institute of Northwestern University

NEW ASSOCIATION MEMBERS

(December 16, 1944, to January 15, 1945)

• This list of 131 new Association Members and 8 Conversions over the monthly period which was interrupted by the Yuletide holidays is ample evidence that the Membership Committees kept up their vigilance despite the customary festivities. These figures show a substantial increase over the same period last year, as Central Ohio, the newest chapter, leads with the fine record of 32 names added to its roster.

Conversions—Personal to Company

***Acme Foundry Co., Minneapolis (H. J. Bierman, Owner) (Twin-City Chapter).**
***The Advance Foundry Co., Dayton, Ohio (Alfred W. Schneble, Sr., Sec.-Treas.) (Cincinnati Chapter).**
***Boss Foundry Co., Bayport, Minn. (Roland Erbst, Foundry Supt.) (Twin-City Chapter).**
***Columbiana Foundry Co., Columbiana, Ohio (Lewis A. Way, Jr.) (Canton Chapter).**
***The Dotson Co., Mankato, Minn. (G. A. Dotson, Owner) (Twin-City Chapter).**
***Ironton Fire Brick Co., Ironton, Ohio (C. E. Bales, Vice-Pres.) (Central Ohio Chapter).**
***Saginaw Malleable Iron Division, G.M.C., Danville, Ill. (F. E. Bassett, Plant Mgr.) (Chicago Chapter).**
***San Francisco Iron Foundry, San Francisco, Calif. (Ralph C. Noah, Mgr.) (No. California Chapter).**

Sustaining Members

†Arnold Engineering Co., Marengo, Ill. (Robert Pottinger, Vice-Pres.) (No. Ill.-So. Wis. Chapter).
†La Grand Industrial Supply Co., Portland, Ore. (John La Grand, Owner & Mgr.).
†Lufkin Foundry & Machine Co., Lufkin, Texas (E. P. Trout, Ass't to Pres.) (Texas Chapter).

CANTON DISTRICT CHAPTER

***McConway & Torley Corp., Pittsburgh, Pa. (Enoch George, Jr., Vice-Pres. in Charge of Operations).**

CENTRAL INDIANA CHAPTER

***American Foundry Co., Indianapolis, Ind. (Edward R. Vanover, Plant Supt.).**
Frank R. Smith, Ass't Plant Supt., American Foundry Co., Indianapolis.

CENTRAL NEW YORK CHAPTER

***Oriskany Malleable Iron Co., Oriskany, N. Y. (Donald J. Merwin).**

CENTRAL OHIO CHAPTER

Robert Black, Foundry Time Study, Cooper-Bessemer Corp., Mt. Vernon, Ohio.
C. A. Bolin, Sec.-Treas., The Marion Foundry Co., Marion, Ohio.
C. E. Brider, Foundry Supt., The Parkersburg Rig & Reel Co., Pomeroy, Ohio.
***Cedar Heights Clay & Coal Co., Oak Hill, Ohio (J. Howard Morgan, Gen. Mgr.).**
Wm. A. Cromwell, Chief Inspector, The Ohio Steel Foundry Co., Springfield, Ohio.
***Cureton Casting Co., Mt. Vernon, Ohio (Sam Cureton).**
***The Davis Fire Brick Co., Oak Hill, Ohio (D. D. Davison).**
Paul Edgar, Foundry Office, Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Paul E. Eubanks, Heat Treating Foreman, Ohio Steel Co., Springfield, Ohio.
Jerry H. Favorite, Night Foreman, Ohio Steel Foundry Co., Sprinfield, Ohio.
I. W. Ferguson, Ass't Plant Mgr., Cooper-Bessemer Corp., Mt. Vernon, Ohio.
R. H. Frank, Ch. Met., The Bonney-Floyd Co., Columbus, Ohio.
J. G. Garrard, V. P. & G. M., Ohio Malleable Iron Co., Columbus, Ohio.
Don Gilchrist, Met., Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Kenneth R. Grube, Res. Engr., Battelle Memorial Institute, Columbus, Ohio.
Norman Hoffman, Foreman, Alten's Foundry & Machine Works, Lancaster, Ohio.
John Kerin, Foundry Foreman, Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Narman H. Keyser, Met., Battelle Memorial Institute, Columbus, Ohio.
W. F. Lamoreaux, Met., Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Charles G. McCabe, Research Engr., Battelle Memorial Institute, Columbus, Ohio.
Don McMillan, Pattern Foreman, Cooper-Bessemer Corp., Mt. Vernon, Ohio.
John J. Quinn, Core Foreman, Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Charles A. Reichelderfer, Ass't Supv., Battelle Memorial Institute, Columbus, Ohio.
Howard Riegger, Instructor, Boys' Trade School, Columbus, Ohio.
David Sanner, Met., Cooper-Bessemer Corp., Mt. Vernon, Ohio.
E. C. Sawyer, Service Engr., Central Silica Co., Zanesville, Ohio.
Mark Schneider, Core Foreman, Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Herman G. Stachelhaus, Foundry Foreman, Cooper-Bessemer Corp., Mt. Vernon, Ohio.
John Steelman, Met., Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Harry Stutzman, Pattern Foreman Ass't., Cooper-Bessemer Corp., Mt. Vernon, Ohio.
Dave Thompson, Pattern Shop Foreman, Ohio Steel Foundry Co., Springfield, Ohio.
Ralph Wagner, Process Insp., Ohio Steel Foundry Co., Springfield, Ohio.

CHICAGO CHAPTER

Raymond A. Bauer, Plant Met., Saginaw Malleable Iron Div., G.M.C., Danville, Ill.
Roy Bennett, Foundry Engr., E. F. Houghton & Co., Chicago.
Mario J. Cardone, Chief Chemist, Pettibone-Mulliken Corp., Chicago.
Edwin McDowd, The Hydro Blast Corp., Chicago.
James Munro, Sr., Ass't Chief Engr., Foundry Equipment Dept., Whiting Corp., Harvey, Ill.

CINCINNATI DISTRICT CHAPTER

Wilbur A. Kramer, Works Mgr., The Advance Foundry Co., Dayton, Ohio.
Alfred W. Schneble, Jr., Met. Engr., The Advance Foundry Co., Dayton, Ohio.
Aubrey C. Scholle, Molder, The Lunkenheimer Co., Cincinnati.

DETROIT CHAPTER

S. R. Grant, Supt., Bostick Foundry Co., Lapeer, Mich.
Ralph L. Lee, General Motors Corp., Detroit, Mich.
George W. Matheson, Service Engr., Peninsular Grinding Wheel Co., Detroit.
William Robert Moggridge, Night Supt., Foundry, Ford Motor Co. of Canada, Ltd., Windsor, Ont.
Jerry B. O'Brien, Sales Engr., Peninsular Grinding Wheel Co., Detroit.
Kenneth E. Palmer, Sales Engr., Peninsular Grinding Wheel Co., Detroit.
***Reliance Foundry Co., Detroit (Robert P. Brown, Pres.).**
Carl A. Underhill, Detroit.

DETROIT CHAPTER—SAGINAW VALLEY GROUP

Franklyn J. Bean, Sr., Supt. Prod., General Foundry & Mfg. Co., Flint, Mich.
Jewel Nelson, General Foundry & Mfg. Co., Flint, Mich.

EASTERN CANADA & NEWFOUNDLAND CHAPTER

***The Rapeutic Electrical Products, Ltd., Levis, Que. (R. Barinbeau, Pres.).**
Bay State Abrasive Products Co. (Canada), Ltd., Brantford, Ont. (Jack Claus, Dist. Repr.).
A. H. Thomson, Dist. Sales Mgr., Canadian Refractories, Ltd., Montreal, Que.
T. G. Tobin, Canadian Pacific Railroad, Rosemont, Que.

METROPOLITAN CHAPTER

Mac Blackman, Chief Engr., American Gyrocasting Co., New York City.
Mortimer Heilner, Prop., Elizabeth Pattern Works, Hillside, N. J.
Clsidore Locascio, Foreman, Eclipse-Pioneer Foundries, Teterboro, N. J.
A. B. Oatman, Ass't Mgr., Eastern Div., National Carbon Co., Inc., New York.
Charles J. Petersen, Process Engr., Wright Aeronautical Corp., Paterson, N. J.
Raymond A. Quadt, Res. Met., American Smelting & Refining Co., Barber, N. J.
C. W. Ross, Engr., The C. O. Bartlett & Snow Co., Cleveland, Ohio.
Charles E. Seman, Eastern Repr., National Founders' Ass'n, New York City.
James Sinkinson, Foundry Equip. Engr., Wright Aeronautical Corp., Paterson, N. J.

*Company Members.
†Sustaining Members.

NORTHEASTERN OHIO CHAPTER

Samuel R. Robinson, Foundry Consultant, Republic Steel Corp., Akron, Ohio.
John L. Rogers, Jr., Specification Consultant, Cleveland.
***Thompson Products, Inc., Cleveland (E. G. Pekarek, Met.).**

NORTHERN CALIFORNIA CHAPTER

James W. Grafton, Supv. Chemist, Joshua Hendy Iron Works, Sunnyvale, Calif.
Raymond Leal, Maintenance Supt., Enterprise Engine & Foundry Co., Richmond, Calif.
Roy W. Parkinson, Core Maker, Pacific Brass Foundry of S. F., San Francisco.
Robert D. Regan, Chief Inspector, Dalmo-Victor, Inc., San Francisco.
Ernest Roffo, Core Maker, Pacific Brass Foundry of S. F., San Francisco.

NO. ILLINOIS AND SO. WISCONSIN CHAPTER

A. F. Carragher, Sales Repr., Republic Coal & Coke Co., Chicago.

ONTARIO CHAPTER

***Canada Electric Castings, Ltd., Orillia, Ont. (W. H. R. Burrows, Gen. Mgr.).**
***Canadian Sumner Iron Works, Ltd., Vancouver, B. C. (G. W. Allan, Pres.).**
Henry A. Getz, Canada Metal Co., Ltd., Toronto, Ont.
Jos. Klasz, Ass't Mgr., Winnipeg Foundry Co., Ltd., Winnipeg, Manitoba.
***Geo. White Sons Co., Ltd., London, Ont. (M. H. Wilson, Works Mgr.).**
J. Allan Wickett, Sales Engr., The Steel Co. of Canada, Ltd., Hamilton, Ont.

PHILADELPHIA CHAPTER

Leonard A. Bonner, Dist. Mgr., Federated Metals Div., American Smelting & Refining Co., Philadelphia.
***Contractors Foundry, Inc., Philadelphia (J. Gilbert Clarke, Pres.)**
Frank J. Daniels, Salesman, Federated Metals Div., American Smelting & Refining Co., Philadelphia.
Norman Geppert, Foreman, Lancaster Malleable Castings Co., Lancaster, Pa.
Harry Richmond, Foreman, Lancaster Malleable Castings Co., Lancaster, Pa.

QUAD-CITY CHAPTER

Milo Dockterman, Vice-Pres., Mississippi Foundry Corp., Rock Island, Ill.
A. W. Gellman, President, Mississippi Foundry Corp., Rock Island, Ill.
George G. Groves, Foundry Supt., Red Jacket Mfg. Co., Davenport, Iowa.
Geo. J. Halligan, Foundry Foreman, Red Jacket Mfg. Co., Davenport, Iowa.
Frank J. Keller, Foundry Foreman, French & Hecht, Davenport, Iowa.
Rollo E. Van Camp, Foundry Foreman, French & Hecht, Davenport, Iowa.

ROCHESTER CHAPTER

Edwin C. Brinson, Chief Chem. & Metal. Engr., Rochester Products Div., G.M.C., Rochester, N. Y.
Fred B. Dantz, Gen. Foreman, Inspection Dept., Rochester Products Div., G.M.C., Rochester, N. Y.
Arthur H. Filander, Designing Engr., Symington-Gould Corp., Rochester, N. Y.

TEXAS CHAPTER

Texas Engineers Library, College Station, Texas.

TOLEDO CHAPTER

Edward Mizerny, Ass't Foreman, Unitcast Corp., Toledo.

TWIN-CITY CHAPTER

Fred Paul De Lore, Foreman, American Hoist & Derrick Co., St. Paul, Minn.
S. M. Eklund, General Supt., D. W. Onan & Sons, Minneapolis, Minn.
***D. W. Onan & Sons, Minneapolis (Paul F. Richardson, Purchasing Agent—Castings).**

WESTERN MICHIGAN CHAPTER

Adolph G. Anderson, Partner, Centrifugal Casting Co., Muskegon, Mich.
Kenneth W. Buelow, Supt., Marshall Furnace Co., Marshall, Mich.
J. H. Gardner, Expeditor & Contact Man, Marshall Furnace Co., Marshall, Mich.
A. C. Kalk, Ass't Chief Inspector, Continental Motors Corp., Muskegon, Mich.
***Marshall Furnace Co., Marshall, Mich. (M. L. Gardner, Pres.).**

WESTERN NEW YORK CHAPTER

George H. Foedish, Foreman, Harrison Radiator Corp., Div., G.M.C., Lockport, N. Y.
T. L. Nelson, Mgr., Electrode Service Engineering Dept., National Carbon Co., Inc., Niagara Falls, N. Y.
Arnold H. Pickett, Foreman, Core Room, Harrison Radiator Corp., Div., G.M.C., Lockport, N. Y.
Ernest R. Starkweather, Research Met., Carborundum Co., Niagara Falls, N. Y.

WISCONSIN CHAPTER

Stanley A. Janik, Brass Foundry Foreman, Allis-Chalmers Mfg. Co., West Allis, Wis.
***Racine Pattern Works, Racine, Wis. (E. J. Simanek, Vice-Pres.).**
Harold Arthur Ziebell, Ceramic Engr., Crucible Steel Casting Co., Milwaukee.

OUTSIDE OF CHAPTER

Henry Carlson, Foundry Supt., Portland Iron Works, Portland, Ore.
***Crawford & Doherty Foundry Co., Portland, Ore. (V. O. Stirnweis, Pres.).**
William C. Henning, Sand Testing, Crawford & Doherty Foundry, Portland, Ore.
A. B. Holmes, Supt., Crawford & Doherty Foundry Co., Portland, Ore.
Norris Merrill, Melter, Pacific Steel Foundry, Portland, Ore.
Royce Michael, Works Engr., Coneygre Foundry, Ltd., Tipton, Staff., England.
***Miller & Zehrung Chemical Co., Portland, Ore. (F. D. Carroll, Mgr. Foundry Dept.).**
***Oregon Brass Works, Portland, Ore. (A. R. Prier, Vice-Pres.).**
***Portland Iron Works, Portland, Ore. (A. J. Wolff, Chief Engr.).**
G. W. Prier, Oregon Brass Works, Portland, Ore.
John J. Sheehan, Managing Dir., Coneygre Foundry, Ltd., Tipton, Staff., England.
H. H. Simpson, New Plymouth, New Zealand.
W. N. Smith, Owner-Mgr., Interstate Brass Foundry, Portland, Ore.
George Oliver Stanley, Met., Cochranes (Middlesbro') Foundry, Ltd., Ormesby Ironworks, Middlesbrough, England.
F. A. Stephenson, Partner, Dependable Pattern Works, Portland, Ore.

AN UP-TO-DATE REFERENCE MANUAL . . . for the

Modern Gray Iron Foundry

A revised A.F.A. Committee publication of authoritative information on the properties, application and production of alloy cast irons.

This revised edition of the ALLOY CAST IRON book contains a correlation of practical knowledge advanced by outstanding authorities on the production and application of alloy cast irons. The 282 pages of text matter contain 96 tables and 123 illustrations, all dealing with the latest alloy gray iron manufacturing methods.

CONTENTS: 1. Metallurgical Principles of the Effects of Alloying Elements in Cast Iron. 2. Effects of Alloying Additions in Cast Irons. 3. Effects of Alloys on the Physical and Mechanical Properties of Gray Irons. 4. Ladle Inoculants. 5. White and Chilled Alloy Cast Irons. 6. Heat Treatment of Alloy Cast Irons. 7. Foundry Practice for Alloy Cast Irons. 8. Specific Applications of Alloy Cast Irons. 9. Index.

AMERICAN FOUNDRYMEN'S ASSOCIATION
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- **The 6 x 9 clothbound book contains data on the qualitative and quantitative effects of alloys . . . forms available . . . methods of addition . . . casting practice . . . heat treatment . . . service and test data . . . specific applications . . . extensive bibliography . . . and a comprehensive cross index.**
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- **Just off the press, this revised edition of the ALLOY CAST IRONS book is a "must" in the gray iron foundryman's reference library. PRICE: $2.75 to A.F.A. MEMBERS.**

See page 27 for list of Chapter representatives whose reports of local activities appear in this issue.

DUST CONTROL METHODS
Are Discussed at Northeastern Ohio

By William G. Gude

MODERN equipment and methods for controlling foundry dust were discussed by six speakers before approximately 150 members and guests at the January 11 meeting of the Northeastern Ohio Chapter. Chapter President R. F. Lincoln, Russell F. Lincoln & Co., Cleveland, presided, with Arthur J. Tuscany, Foundry Equipment Manufacturers' Association, Cleveland, in charge of the technical program.

Preceding the main discussions, a short talk on Cleveland's new Bureau of Industrial Hygiene was given by H. G. Dyktor, its chief. Mr. Dyktor stated that his department was particularly interested in foundry working conditions, but that its activities would be on a co-operative and common-sense basis rather than those of a law-enforcement agency.

First of the talks on dust control equipment was given by John M. Kane, American Air Filter Co. Inc., Louisville. Stating that the foundry industry has made exceptional progress in recent years in correcting the dust problem, Mr. Kane presented slides showing typical installations of shakeout hoods, cleaning room exhaust equipment, electric furnace hoods and special collectors for use in grinding and finishing magnesium castings.

C. A. Snyder, American Foundry Equipment Co., Mishawaka, Ind., described in detail an extensive installation of dust control equipment by the Lodge & Shipley Machine Tool Co., Cincinnati. This company does not make castings but is required to do considerable grinding before machining the castings it purchases. A 25 per cent reduction in cleaning costs was reported to result from the dust control installation. The speaker also explained the principle of the American cloth bag type collectors.

John J. Watson, C. O. Bartlett & Snow Co., Cleveland, was introduced by Harry C. Orr of the same company. Mr. Watson pointed out that the rule-of-thumb method cannot be used in figuring air exhaust requirements, particularly for shakeout hoods, because there are too many variables which must be considered. He presented a number of slides to illustrate various dust collector installations and shakeout side hoods.

W. O. Vedder, Pangborn Corp., Hagerstown, Md., emphasized that dust control is a vital factor in foundry operations despite the lack of salvageable value of the collected dust which necessitates measuring the worth of control equipment in intangibles. Mr. Vedder described various hoods, centralized and unit type collectors, and the dust wetter, the latter a small mill for turning the dry dust into a sludge to aid in its disposal. He urged foundries to get the maximum from their investment in dust control equipment by regular inspection.

E. F. Fisher, Whiting Corp., Harvey, Ill., pointed out that since air is the vehicle for conveying dust, collecting systems must be designed on sound air engineering principles if they are to be fully effective. He recommended that the first consideration in planning a dust control installation be the determination of whether or not the production of dust can be reduced at its sources and thereby require a less expensive system. Various types of equipment, including the cupola spark and fly ash suppressor, were described.

C. C. Hermann, Claude B. Schneible Co., Detroit, concluded the talks with a review of that company's wet

National Officers' Night was held by the Twin City Chapter on November 28 at the Leamington Hotel, Minneapolis. Chapter Chairman A. M. Fulton, Northern Malleable Iron Co., St. Paul, introduced National Director S. V. Wood who, in turn, introduced President Ralph J. Teetor, Vice-President Fred J. Walls, National Director H. S. Simpson, and National Secretary R. E. Kennedy.

The keen competition prevailing in the tournaments held by the Southern California Chapter indicates that it will soon be necessary to form a third league to accommodate increased applications for places on teams, and matches are now held on two nights a week instead of one night.

type system for collecting and disposing of dust. This included descriptions of shakeout hoods and collectors. One installation discussed was a down-draft shakeout exhaust system, a type used where space considerations prevent use of the usual side hood.

N. Illinois-S. Wisconsin Hears A. F. Pfeiffer

By Howard W. Miner

MEMBERS and guests attending the January 9 meeting of the Northern Illinois and Southern Wisconsin Chapter at Hotel Faust, Rockford, Ill., heard A. F. Pfeiffer, Allis Chalmers Mfg. Co., West Allis, Wis., discuss patterns and the developments of casting procedure.

Many models and slides were used by Mr. Pfeiffer during his talk on "Pattern and Casting Engineering." According to the speaker, models can play an important part in the production of large and difficult jobs, and their use in patternmaking, molding and redesigning was demonstrated. The use of models enables department heads to visualize together the problems to be overcome.

The speaker pointed out that a pattern that is not handled and stored with care will prove a costly pattern in the foundry. He pointed out numerous cases where the cooperation of design engineer, patternmaker and foundryman resulted in better casting production. He also stressed the importance of engineering jobs to fit available equipment and cited an example of one job being so engineered that it was made substantially the same way in four different foundries at the same time. This resulted in the pooling of experience and the rapid solution of problems.

The pattern shop of the speaker's plant not only builds patterns, but has placed itself in a position to service castings. According to the speaker, you cannot buy the defects out of castings, you have to service them out.

Chairman R. W. Mattison, Mattison Machine Works, Rockford, Ill., introduced the speaker of the evening as well as visiting A.F.A. members.

A.F.A. Educational Plans Reviewed at Rochester

By Carl B. Johnson

APPROXIMATELY 60 members and guests welcomed National Director R. T. Rycroft, Jewell Alloy and Malleable Co., Inc., Buffalo, and N. F. Hindle, Director, Technical Development Program, A.F.A., Chicago, at a meeting of the Rochester Chapter held at the Seneca Hotel on January 12.

Mr. Rycroft talked on the outlook of the foundry industry and Mr. Hindle discussed the functions and objectives of the A.F.A. educational activities. The production of the maximum quantities of war material of the best quality and design and the improvement of foundry products to make them even more dependable and useful, now and in the peace to follow, are among the aims and accomplishments of the A.F.A. educational activities.

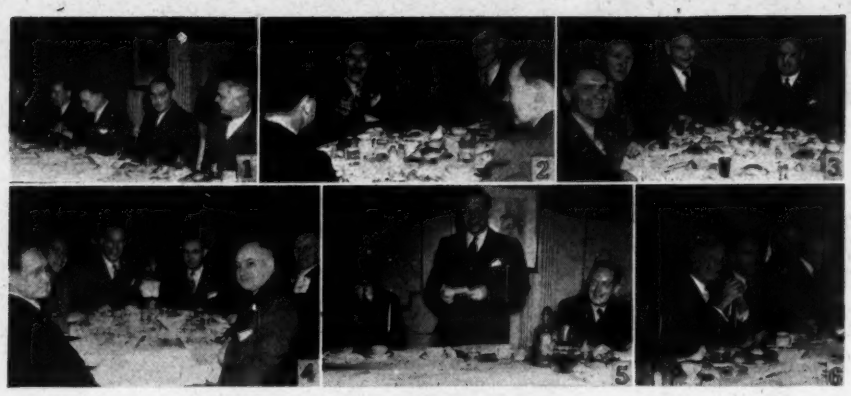
Figures reveal that there has been a threefold growth in membership during the chapter's first year of existence.

Central New York Holds Non-Ferrous Meeting

By John A. Feola

CHAIRMAN L. E. HALL, Syracuse Chilled Plow Co., Syracuse, N. Y., presided at the Central New York Chapter meeting at the Onondaga Hotel, Syracuse, N. Y., January 12, which featured Wm. Romanoff, H. Kramer & Co., Chicago.

Mr. Romanoff described the method used in making copper alloy ingots, stressing the selection and sorting of scrap and constant chemical analysis as the basis of good ingot production. The speaker outlined the correct foundry practice of several commonly used copper alloys and opened a discussion period after each alloy. Aluminum bronzes were suggested as possible competition for steel castings because of their tough-



(Photos by S. B. Hutchinson, Hutchinson & Sons.)

Ontario Chapter meeting, held at Hotel London, London, Ont., December 8. Photos show: (1) F. J. Walls, Vice-President A.F.A., International Nickel Co., Detroit; Robert Robertson, International Harvester Co. of Canada Ltd., Hamilton, Ont.; H. E. Craddock, Beatty Bros. Ltd., London, Ont.; H. Bloxam, Empire Brass Mfg. Co., London, Ont.; Walter Sullivan, General Steel Wares, London, Ont. (2 and 3) Unidentified groups. (4) Gavin B. Young, Standard Metal Co., Brentford, Ont.; J. H. King, Werner G. Smith Ltd., Toronto; T. D. Barnes, Don Barnes Foundry Supplies & Equipment, Hamilton, Ont.; M. S. Zalev, Zalev Bro. Ltd., Windsor, Ont.; W. Lapsley, Massey Harris Co. Ltd., Toronto; A. Reyburn, Massey Harris Co. Ltd., Toronto. (5) H. M. Gregory, Walker Metal Products Ltd., Walkerville, Ont.; F. J. Walls; Robert Robertson. (6) J. J. McFadyen, Galt Malleable Iron Co. Ltd., Galt, Ont.; Joe Sully, National Director A.F.A., Sully Brass Foundry Ltd., Toronto; T. D. Barnes and H. M. Gregory.

ness, high tensile strength and corrosion resistance.

In speaking of chrome-copper alloys, which are steadily gaining wider usage, Mr. Romanoff stated that the most successful way of keeping the chromium in the copper was to add it to the melt after the metal has been de-oxidized.

J. H. Van Deventer Talks Post-War to Rochester

By Donald E. Webster

ABOUT 70 members and guests of the Rochester Chapter heard J. H. Van Deventer, "Iron Age," New York, discuss "The Position of the Foundry Industry in the Post-War Period," at the Hotel Seneca, Rochester, N. Y., December 16.

Mr. Van Deventer told about many of his experiences in his recent study of business conditions abroad. In his opinion the foundry industry has great possibilities for growth in coming years, but only if foundrymen will make careful studies of undeveloped markets and of users' needs in order to produce a variety of products to meet rigid requirements.

According to the speaker, accurate cost accounting is an essential for successful operations. He predicts that the use of molding materials, as we know and use them today, will decrease and there will be a trend toward longer lived materials and centrifugal casting processes.

The Rochester Chapter, one of three organized in 1944, held an election of officers and directors to serve until July 1, 1945, thus placing them on the A.F.A. fiscal year. Those elected to new offices, all having company connections in Rochester, are as follows: *President,* Walter F. Morton, Anstice Co., Inc.; *Vice-President,* Walter G. Brayer, Bausch and Lomb Optical Co.; *Secretary-Treasurer,* Carl B. Johnson, Symington-Gould Corp. New directors are: David D. Baxter, Sterling Wheelbarrow Co.; Neal F. Clement, Rochester-Erie Foundry Co., and H. B. Hanley, American Laundry Machinery Co., the retiring president.

Chicago Chapter Features Round Table Meetings

APPROXIMATELY 150 members and guests attended the round table meeting of the Chicago Chapter, January 2, at the Chicago Bar Association Restaurant, Chicago, with Chapter Chairman A. S. Klopf, Firegan Sales Co., Chicago, presiding.

Chairman Klopf introduced L. H. Hahn, Sivyer Steel Castings Co., Chicago, as speaker for the Steel Division round table; C. G. Mate, Greenlee Foundry Co., Cicero, Ill., for the Gray Iron Division; H. J. Jacobson, Industrial Pattern Works, Chicago, for the joint meeting of the Non-Ferrous and Pattern Divisions; and W. R. Jaeschke, Whiting Corp., Harvey, Ill., for the Malleable Division.

Prior to the group meetings, D. H. Lucas, chairman of the Membership Committee, read the names of those who became members of A.F.A. since the report made at the November meeting, bringing the total Chicago Chapter membership to about 700.

Central New York Holds Annual Christmas Party

By John A. Feola

SOME 220 members and guests of the Central New York Chapter gathered in the ballroom of the Onondaga Hotel, Syracuse, N. Y., for the 4th annual Christmas party, December 16.

Chapter Chairman L. E. Hall, Syracuse Chilled Plow Co., Inc., Syracuse, N. Y., presided and welcomed members and guests from other A.F.A. Chapters. J. F. Livingston, Crouse Hinds Co., Syracuse, N. Y., headed the committee on arrangements.

Refractories Subject for Saginaw Valley Group

By Joseph J. Clark

C. E. BALES, Ironton Firebrick Co., Ironton, Ohio, a Director of the new Central Ohio Chapter, was guest speaker at the Detroit Chapter-Saginaw Valley Group meeting, held at Frankenmuth, Mich., January 4, on the subject of "Modern Refractories."

According to the speaker, the refractories industries are key industries in the war effort and, despite heavy war-time demands, they have been able to make strides in the development of new, improved materials, as well as to maintain the level of quality essential to refractory life.

Samples used in the preparation of refractories were passed around the audience, and slides were used to show the old and new methods of processing, as used in the speaker's

plant. The recommended methods of lining cupolas, forehearths and ladles with different refractories were also illustrated. Factors to be considered in selecting the most effective and economical refractory for a certain job were discussed.

The speaker called attention to the importance of drying and preheating ladles and declared that care in drying and preheating ladles is well rewarded by increased service from the ladles and more salable castings.

Chicago 1945 Lecture Course Under Way

ROY W. SCHROEDER, Washburne Trade School, Chicago, as chairman of the Lecture Course Committee of the Chicago Chapter, opened the 1945 series at its initial meeting in the Peoples Gas Building Auditorium, Chicago, January 17. Under the guidance of the Technical Chairman Oscar Blohm, Hills-McCanna Co., Chicago, the subject of "Aluminum and Magnesium" was presented to the 165 in attendance by two speakers, Charles Scullin, W.P.B., St. Louis, and Allen Brantingham, Ebaloy Foundries Inc., Rockford, Ill.

Mr. Schroeder stated that this year's series would round out the program planned four years ago. Patterns, refractories, and cores have been considered in the last three years with finishing to be considered this year in concluding the cycle.

The following are members of the Lecture Course Committee: *Chairman,* Roy W. Schroeder; *Secretary,* E. H. Pritchard, Western Materials Co., Chicago; W. B. George, R. Lavin & Sons, Inc., Chicago; J. C. Gore, Werner G. Smith Co., Div. Archer-Daniels-Midland Co., Chicago; A. W. Gregg, Whiting Corp., Harvey, Ill.; L. H. Hahn, Sivyer Steel Castings Co., Chicago; C. G. Mate, Greenlee Foundry Co., Cicero, Ill.; J. C. Thomas, Whiting Corp., Harvey, Ill.; and R. A. Witschey, A. P. Green Fire Brick Co., Chicago.

Western New York Holds Fellowship Meeting

By J. Ralph Turner

APPROXIMATELY 350 were in attendance at the annual stag party of the Western New York Chapter held at the Elks Club, Buffalo, January 13.

Chapter Chairman Reinhold D. Loesch, Lake Erie Foundry Co., Buffalo, presided at this meeting, which was given over entirely to fellowship. The committee in charge of arrangements provided a buffet supper and two hours of entertainment.

National Officers' Night Held at Eastern Canada

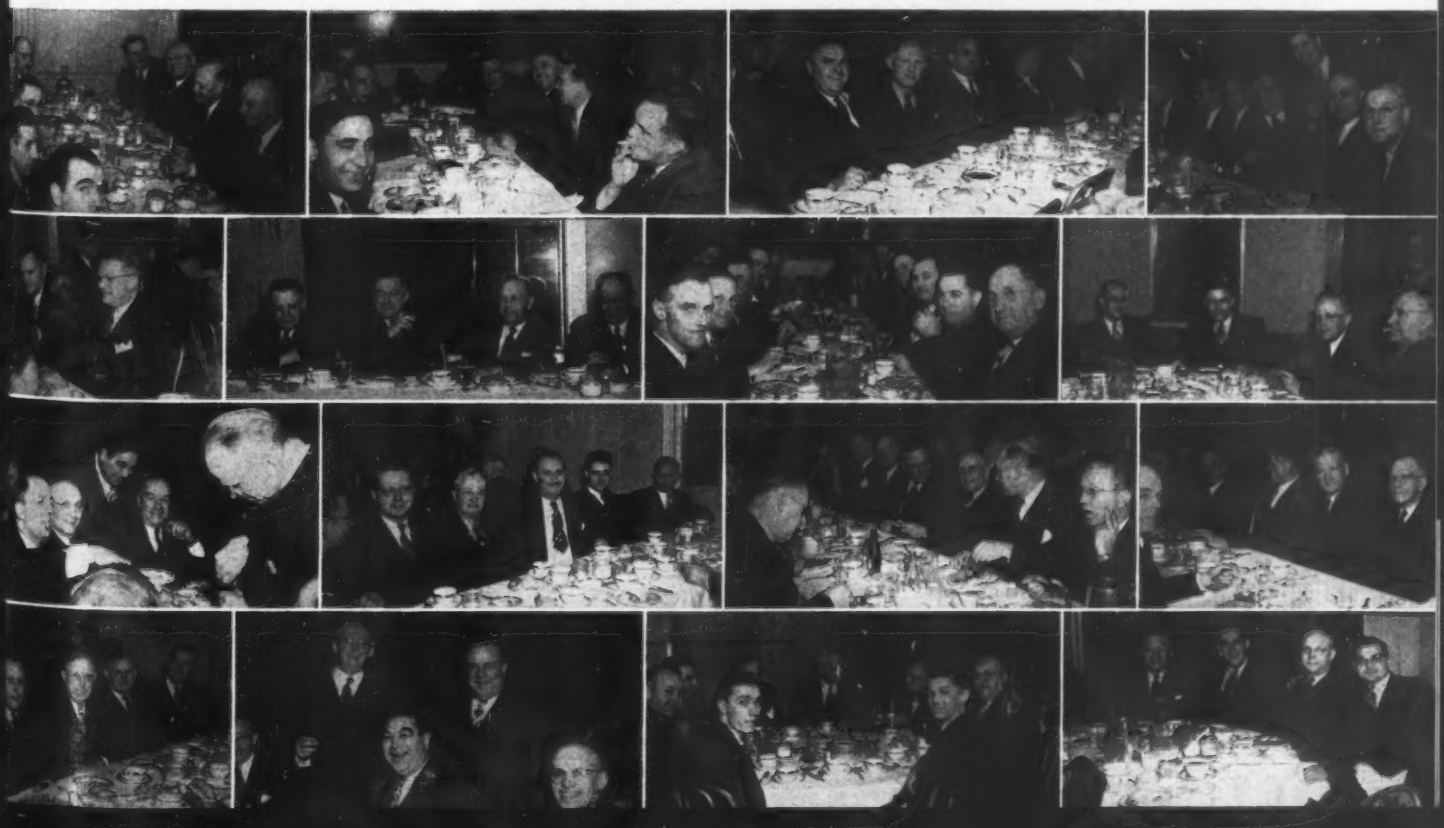
By G. Ewing Tait

THE Eastern Canada and Newfoundland Chapter of A.F.A. held its first Christmas party on December 15 as a National Officers' Night. The national officers of A.F.A. who attended were National Vice-President Fred J. Walls, International Nickel Co., Detroit; National Director R. T. Rycroft, Jewell Alloy & Malleable Co., Buffalo; National Director Joseph Sully, Sully Brass Foundry, Ltd., Toronto; Business Manager W. W. Maloney, A.F.A. Office, Chicago.

Guest speaker was Gabriel Rousseau, Director, Arts & Crafts School, Montreal. Mr. Rousseau described the technical educational programs set up by the Province for boys of various ages and with different amounts of schooling. Short courses to train machine operators and four-year technical school courses for boys who have completed their tenth year are designed to turn out skilled operators, as well as technically trained tradesmen who are potential foremen and superintendents. Ac-

As in past years, the Wisconsin Chapter's Christmas Party was a huge success, with Chapter Members bringing friends to take part in the fun and enjoy the fine program.

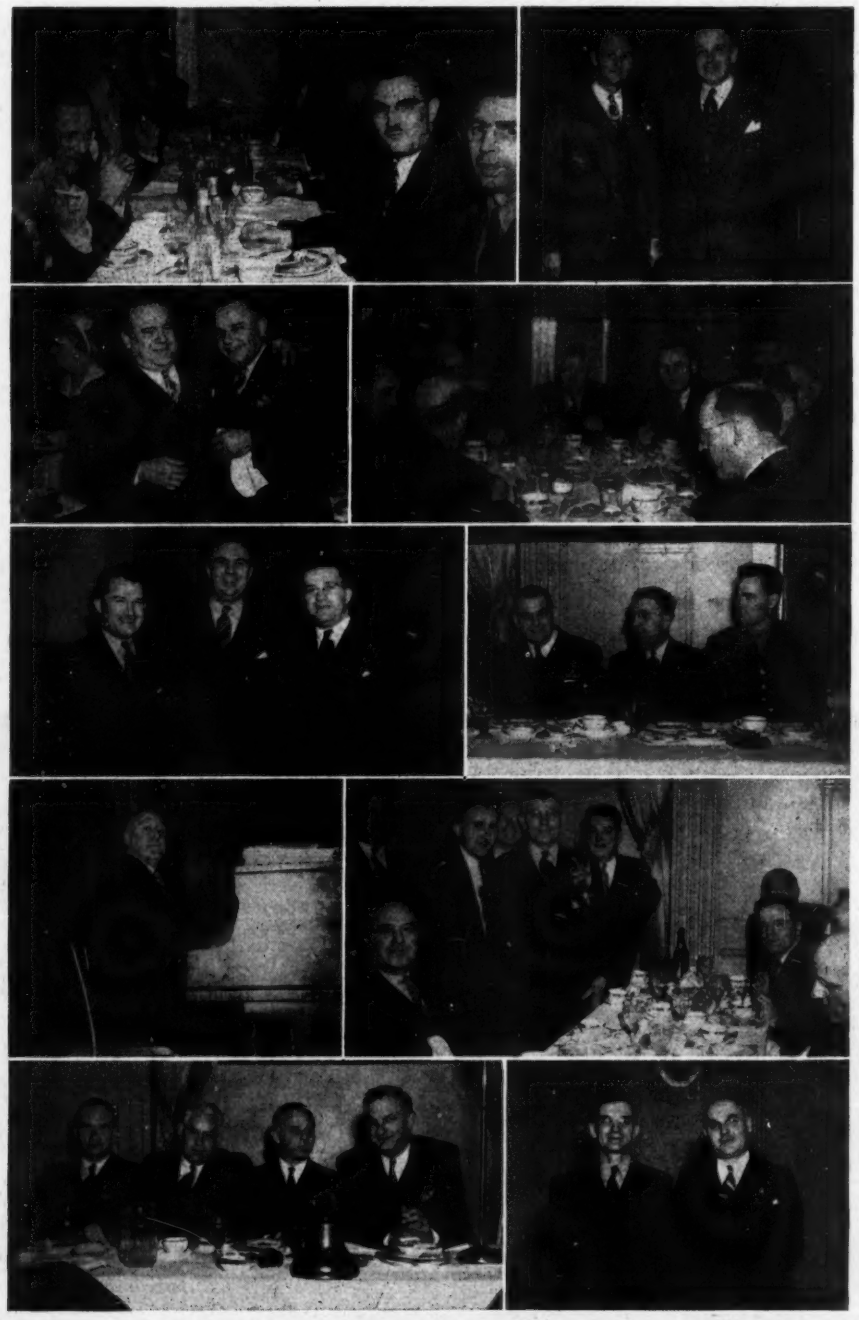
(Photos courtesy John Bing, A. P. Green Fire Brick Co.)



cording to the speaker, the Provincial Technical Schools are in a good position to supply the trained men to be required by industry in the future in order to adequately meet rigid post-war demands.

Another feature of the evening was the presentation of special A.F.A. Past Chairman's buttons by Chapter Chairman R. Bernard, La Cie J. A. Gosselin, Ltee., Drummondville, Que., to R. W. Bartram, Robert W. Bartram, Ltd., Montreal, Que.; C. C. Brisbois, Robert Mitchell Co., Ltd., Montreal, Que., and E. N. Delahunt, Warden King, Ltd., Montreal.

Much of the success of the evening was due to the Entertainment Committee, headed by George Turnbull, Canadian Car & Foundry, Ltd., Montreal, with L. Saindon, Quebec Brass & Iron Foundry Co., Ltd., Levis, Quebec, as Vice-Chairman. Other members were M. A. Hughes, La Salle Coke Co., Montreal; Jas. H. Newman, Chamberlain Engineering (Canada), Ltd., Montreal; Paul Savoie, Webster & Sons, Ltd., Montreal.



(Photos courtesy John Bing, A. P. Green Fire Brick Co.)

More views of the Wisconsin Christmas party, held at the Schroeder Hotel, Milwaukee, proving that John Bing is quite a master in the art of photography. Of course, his subjects posed with complete confidence that the results would be satisfactory!

Cincinnati Chapter Hears Nathan Janco

By J. Schumacher

NATHAN JANCO, Centrifugal Casting Machine Co., Tulsa, Okla., was the guest speaker at a joint meeting of the Cincinnati Chapter and the Engineering Society of Cincinnati, held at the Engineers' Club, Cincinnati, January 8.

Mr. Janco, in discussing "Centrifugal Casting Methods," used a number of slides showing the application both in ferrous and non-ferrous work. He pointed out the places and types of castings where the advantages of centrifugal casting methods were particularly applicable. He also mentioned instances where centrifugal castings are not adaptable because the static casting yield is sufficiently high not to warrant a change.

Chapter Chairman Wm. A. Rengering, Cincinnati Milling Machine Co., Cincinnati, Ohio, presided at the meeting and welcomed the members of the Engineering Society to this joint gathering.

Quad City Chapter Meets With Members of ASM

By H. L. Creps

MEMBERS of the Quad City Chapter of A.F.A. and the Tri-City Chapter A.S.M. held their annual joint meeting at Fort Armstrong Hotel, Rock Island, Ill., January 9, with A. W. Demmler, Campbell, Wyant & Cannon Co., Muskegon, Mich., as the guest speaker.

Iron-carbon diagrams were illustrated, iron structures and the use of inoculants in iron were discussed by Mr. Demmler in his talk on "Inherent Characteristics of Steel and Iron." In discussing steel, the speaker briefly explained S curves, and transformation and quenching values. The importance of large radii was considered, as well as the change of characteristics through the use of intensifiers.

A.S.M. Vice-Chairman R. H. Swartz, Ordnance Steel Co., Davenport, Iowa, presided at the joint meeting, which included the showing of a moving picture which brought out the importance of quick action in the termination of government contracts.

First Sectional Meeting Held by Ontario Chapter

By G. L. White

THE first special Western Ontario meeting of the Ontario Chapter was held in Hotel London, London, Ont., on December 8. This regional meeting had 125 in attendance with representation from foundries in London, Toronto, Hamilton and other points in the central part of the Province. R. T. Robertson, International Harvester Co., of Canada, Ltd., Hamilton, Ont., Chairman of Ontario Chapter, presided. Following brief entertainment and a welcome by Harry Craddock, Beatty Bros., Ltd., London, Ont., the speaker, F. J. Walls, Vice-President A.F.A., International Nickel Co., Detroit, was introduced by H. M. Gregory, Walker Metal Products, Ltd., Walkerville, Ont.

Speaking on "Trends in the Foundry Industry," Mr. Walls placed particular emphasis upon the need for more attention to human relationship. He felt that there was great need for the application of the golden rule to relationships between management and workers. Dealing with challenges to the foundry industry from other types of production, Mr. Walls ventured the opinion that plastics would offer little competition for iron and steel, but there is a need for the foundry industry to work together to promote the use of castings in the face of competition from stampings, forgings and welded structures.

Other foundry trends discussed by the speaker included marketing, the necessity for cleaning up the foundry, and mechanization. In production methods, reference was made in the trend toward centrifugal castings, the lost wax method for production of castings to close tolerances and other developments. As a result of wartime experience, castings will likely be bought to closer dimensions and more exacting physical and mechanical specifications in the future.

Following the discussion period, National A.F.A. Director Jos. Sully, Sully Brass Foundry, Ltd., Toronto, proposed a vote of thanks for the speaker.

(Photo courtesy Geo. W. Lodyga, Buick Motor Co.)

View of speakers' table at the January 4 meeting of the Saginaw Valley Group, held at Fisher's Hotel, Frankenmuth, Michigan.

November 24 Meeting

Round table meetings were featured at the November 24 meeting, held at the Royal Connaught Hotel, Hamilton, Ont. "Castings Defects and Remedies" was the subject for the various groups which had the following chairmen and speakers:

Gray Iron — Chairman, C. O. Flowers, Canada Iron Foundries, Ltd., Hamilton; Speaker, E. Deutschlander, Worthington Pump & Machinery Corp., Buffalo. Non-Ferrous —Chairman, J. Dick, Sully Brass Foundry, Ltd., Toronto; Speaker, Wm. L. Bond, Ottawa Car Aircraft Co., Ltd., Ottawa. Malleable—Chairman, R. Williams, McKinnon Industries, Ltd., St. Catharines; Speaker, G. L. Gaukroger, McKinnon Industries, Ltd., St. Catharines. Steel—Chairman and Group Leader, W. J. Hall, Fahralloy, Ltd., Orillia.

Reports on Chapter Activities

Officers and representatives of A.F.A. chapter and other foundry groups who report on local activities in this issue are identified below:

Canton District—Nils E. Moore, Wadsworth Testing Laboratory, Wadsworth, Ohio; Chapter Reporter.

Central New York—John Feola, Crouse-Hinds Co., Syracuse, N. Y.; Chapter Reporter.

Cincinnati—Jos. Schumacher, Hill & Griffith Co., Cincinnati; Chapter Secretary.

Eastern Canada and Newfoundland—G. Ewing Tait, Dominion Engineering Works, Lachine, Que.; Chapter Vice-Chairman.

No. Illinois-So. Wisconsin—Howard W. Miner, Fairbanks, Morse & Co., Beloit, Wis.; Chapter Secretary.

Northeastern Ohio—Wm. G. Gude, THE FOUNDRY, Cleveland; Chapter Reporter.

Ontario—G. L. White, Westman Publications Ltd., Toronto; Chapter Secretary-Treasurer.

Philadelphia—B. A. Miller, Cramp Brass & Iron Founders Div., Baldwin Locomotive Works, Eddystone, Pa.; Chapter Director.

Quad City—H. L. Creps, Frank Foundries Corp., Moline, Ill.; Chapter Secretary-Treasurer.

Rochester—Carl B. Johnson, Symington-Gould Corp., Rochester; Chapter Secretary-Treasurer. D. E. Webster, American Laundry Machine Co., Rochester; Chapter Reporter.

Saginaw Valley—J. J. Clark, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich.; Chapter Reporter.

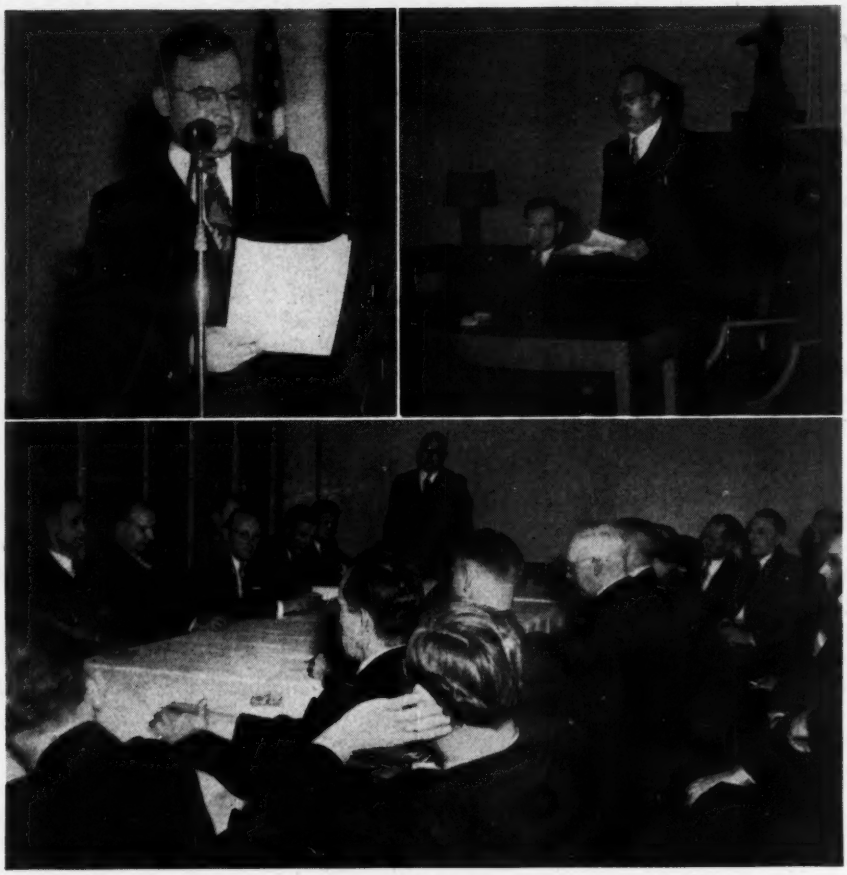
St. Louis—C. E. Rothweiler, Hickman, Williams & Co., St. Louis; Chapter Secretary-Treasurer.

Western New York—J. Ralph Turner, Queen City Sand & Supply Co., Buffalo; Chapter Secretary.

Sound Castings Topic At Canton District

By Nils E. Moore

A CANTON District Chapter meeting was held at the Canton Elks Club, January 11, with



Round table meetings never fail to bring a good turnout for the Chicago Chapter. These pictures were taken at a recent gathering held at the Chicago Bar Association Restaurant, the usual meeting place.

F. G. Sefing, International Nickel Co., N. Y., as the speaker. "A Study of Molding Methods for Sound Castings" was the subject presented to some 56 members and guests by Mr. Sefing. The speaker stated that clean metal, type of gating, design, venting, use of chills and their application with regard to directional solidification were factors in the production of good castings.

The speaker urged foundrymen to assume their responsibility in bringing points of faulty design to the attention of engineers. He also recommended that accurate records of production of good castings be kept, so that the procedure may be duplicated.

Movies taken during the chapter's fall picnic by M. G. Winters, Winters Foundry and Machine Co., Canton, Ohio, were shown as well as a sound film, "Men of Fire."

Chapter Chairman Karl F. Schmidt, United Engineering & Foundry Co., Canton, Ohio, read a letter of resignation from Vice-Chairman A. H. Lankford, now with Mathieu and Sons Foundry Co., Bridgman, Mich. Mr. Lankford's interest and effort were instrumental in bringing the Canton District Chapter into existence.

E. E. Woodliff Speaks To St. Louis Group

By C. E. Rothweiler

SOME 90 members and guests attended the St. Louis District Chapter meeting held at the De Soto Hotel, January 11, to hear E. E. Woodliff, Foundry Sand Service Engineering Co., Detroit.

Charts were used by Mr. Woodliff during his talk which highlighted the following items: "Foundry Sands, an Engineering Problem," "Can't Cure Sand Problems in Several Hours," "How to Determine the Best Core Oil Suitable to the Job" and "How to Classify Binders for Dry Strength and Green Strength." The speaker told of the results obtained in the finish of steel castings through the use of chrome oxide in mold washes.

Quiz Program Is Feature At Philadelphia Meeting

By B. A. Miller

OVER 100 members and guests listened to an "Information Quiz" program at the Philadelphia Chapter meeting, held at the Engineers' Club, Philadelphia, December 8.

T. H. Nelson acted as the Judge with the following serving on the panel: *Gray Iron*—National Director Max Kuniansky, Lynchburg Foundry Co., Lynchburg Va.; *Steel*—Werner Finster, Reading Steel Casting Div., American Chain and Cable Co., Reading, Pa., and Wm. E. Hoffman, Birdsboro Steel Foundry and Machine Co., Birdsboro, Pa.; *Non-Ferrous*—Robt. E. Ward, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J., and R. J. Keeley, Ajax Metal Co., Philadelphia.

The authors of questions which the panel was not able to answer were entitled to a free admission ticket to any later meeting of the Philadelphia Chapter.

AN UP-TO-DATE REFERENCE MANUAL . . . for the MODERN

GRAY IRON FOUNDRY

A revised A.F.A. Committee publication of authoritative information on the properties, application and production of alloy cast irons.

This revised edition of the ALLOY CAST IRON book contains a correlation of practical knowledge advanced by outstanding authorities on the production and application of alloy cast irons. The 282 pages of text matter contain 96 tables and 123 illustrations, all dealing with the latest alloy gray iron manufacturing methods.

● The 6 x 9 clothbound book contains data on the qualitative and quantitative effects of alloys . . . forms available . . . methods of addition . . . casting practice . . . heat treatment . . . service and test data . . . specific applications . . . extensive bibliography . . . and a comprehensive cross index.

● Elements discussed include Aluminum, Bismuth, Carbon, Chromium, Cobalt, Copper, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Silicon, Sodium, Sulphur, Titanium, Telurium, Tungsten, Vanadium and Zirconium.

● Just off the press, this revised edition of the ALLOY CAST IRONS book is a "must" in the gray iron foundryman's reference library. PRICE: $2.75 to A.F.A. MEMBERS.

CONTENTS: 1. Metallurgical Principles of the Effects of Alloying Elements in Cast Iron. 2. Effects of Alloying Additions in Cast Irons. 3. Effects of Alloys on the Physical and Mechanical Properties of Gray Irons. 4. Ladle Inoculants. 5. White and Chilled Alloy Cast Irons. 6. Heat Treatment of Alloy Cast Irons. 7. Foundry Practice for Alloy Cast Irons. 8. Specific Applications of Alloy Cast Irons. 9. Index.

AMERICAN FOUNDRYMEN'S ASSOCIATION
222 WEST ADAMS STREET
Chicago 6, Illinois

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th St., New York, N. Y.

Adhesives

METAL - NONMETAL. *"Adhesives for Metals and Nonmetals,"* Kenneth Rose, METALS AND ALLOYS, October, 1944, vol. 20, no. 4, pp. 959-963.

New adhesives, made of a rubber constituent combined with synthetic resins, have made it possible to glue together like metals, dissimilar metals, or metals and nonmetals. The bond formed by the new adhesives is so strong that in some cases its use has displaced riveting or other methods of composite fabrication. Without a doubt the development of these new adhesives has opened up a wide new field for the use of materials.

Alloy Cast Iron

VANADIUM. *"Vanadium in Gray Iron Castings,"* R. G. McElwee and T. E. Barlow, THE FOUNDRY, December, 1944, vol. 72, no. 12, pp. 88-89, 246, 248, 250, 252.

Vanadium is a carbide stabilizing element which tends to produce a uniformly sized graphite flake throughout all sections of a casting. It promotes a very fine carbide structure. Its effect on depth of chill varies with the percentage of vanadium present.

Vanadium additions improve tensile strength, transverse strength, brinell hardness, wear resistance, and heat resistance. Although vanadium is effective when used by itself, its outstanding characteristic is its ability to accentuate the effectiveness of other alloying elements.

The authors give typical analyses of vanadium cast irons and numerous specific applications. Probably the most important applications are those which combine the need for wear resistance with heat resistance.

Aluminum-Base Alloys

DIE CASTING. *"Aluminum Die-Cast Test Bars,"* James Erickson, LIGHT METAL AGE, November, 1944, vol. 2, no. 7, pp. 24-25, 28.

The author describes a series of tests performed on die castings, varying the size of gate and the air pressure within the die cavity. He presents the results of some of these experiments in tabular form.

Results of the experiments show that air trapped in the die cavity lowers the physical properties of most aluminum-base alloys, that trapped air tends to prevent the formation of a modified structure in normal eutectic silicon aluminum alloys, and that superior physical properties can be obtained from ordinary aluminum-base alloys only when all gases are allowed to escape from the die cavity so that it may be completely filled with metal.

INDUCTION MELTING. *"Properties of Aluminum Alloys Melted in Induction Heated Crucible Furnace,"* James W. Poynter, ALUMINUM AND MAGNESIUM, December, 1944, vol. 1, no. 3, pp. 20-21, 27-28.

Molten aluminum combines readily with the oxygen in water vapor, releasing hydrogen as a gas which dissolves in the metal and is the cause of the most frequent defects in aluminum castings. Water vapor may come from three sources: the room atmosphere, products of combustion, and water adsorbed on the solid metal. It was believed that induction melting in a covered crucible would eliminate the first two sources of water vapor and thereby reduce the amount of hydrogen gas which could cause porous defects.

The author melted three aluminum-base alloys both in a closed crucible in an induction-heated crucible furnace and in a gas-fired crucible furnace in the ordinary way. None of the usual means for fluxing aluminum-base alloys were employed with the induction-heated melts.

Results of the foregoing experiments indicated that aluminum-base alloys melted in a high frequency induction furnace had physical properties in excess of the minimum values given in the ANA specifications for those alloys. Repeated remelting and recasting did not substantially change the compositions of the alloys. Physical properties, soundness and microscopic structure of test bars cast from metal melted in the induction furnace without the use of fluxing methods were equal to those of bars cast from metal which was melted in a gas-fired furnace and treated with chlorine gas.

PERMANENT MOLD CASTINGS. *(See Permanent Mold Castings.)*

PERMANENT MOLD CASTINGS. *"Gravity Die Casting of Aluminum Alloys,"* A. Vath, LIGHT METAL AGE, November, 1944, vol. 2, no. 7, pp. 14-19. Translated by Enfield Rolling Mills Ltd., England.

An article on the requirements and applications of the permanent mold method of casting aluminum-base alloys, summarized by the author as follows:

"For the successful application of Gravity Die-Casting, the casting must be correctly designed from a moulding and casting point of view. The greater the number and the weight, the more profitable is the process.

"The flawless manufacture of thin castings is difficult. It requires a careful arrangement of gate and risers. Ribbed components may require a segmental mould. Sand cores impair the accuracy and strength of a casting and should be avoided, where possible. A badly designed permanent mould may produce weaker castings than a sand mould. Very complicated Gravity Die-Castings tend to form flaws in some places, but the practical use of these castings need not be prejudiced by such porous inclusions. The more important Gravity Die-Casting alloys and their respective use are discussed."

Analysis

SPECTROGRAPHIC. *"Spectrograph Speeds Analysis Work in New Allis-Chalmers Laboratory,"* G. W. Birdsall, STEEL, December 25, 1944, vol. 115, no. 26, pp. 72-73, 112, 114.

Allis-Chalmers observes that spectrographic analysis is profitable when large numbers of similar analyses must be made and time savings are important.

Brass and Bronze

DEGASSING. *"The Removal of Gases from Molten Bronzes,"* W. A. Baker and F. C. Child, EXTRACT FROM THE INSTITUTE OF METALS, LONDON, 1944, vol. 70, pp. 349-422.

Tin bronzes are subject to gas unsoundness arising in particular from solution and evolution of hydrogen, and to a lesser extent from water vapor, carbon monoxide, and sulphur dioxide. In the absence of elements with a high affinity for oxygen, which form comparatively insoluble oxides, hydrogen may be eliminated by oxidation of the melt, followed by deoxidation to remove the excess of oxygen added. Commercial bronzes such as are used for sand castings generally contain considerable amounts of phosphorus and/or zinc which hinder the removal of hydrogen, etc., by oxidation. Hydrogen can be readily removed by scavenging treatments with inert gases and/or by the addition to the charge of substances which evolve inert gases during melting.

Chemical Analysis

NITROGEN. *"Nitrogen, Its Determination in Mild Steel by a Semi-Micro Method,"* S. D. Steele, IRON AND STEEL, November, 1944, vol. 17, no. 16, pp. 669-670.

A colorimetric determination which is faster and equal to or better than the Allen method in accuracy.

Converter Steel

SIDE BLOWN. *(See Steel.)*

Corrosion

INTERCRYSTALLINE. *(See Zinc-Base Alloys.)*

IRON AND STEEL. *"Metallic Corrosion,"* U. R. Evans, IRON AND STEEL, November, 1944, vol. 17, no. 16, pp. 686-690.

Research was undertaken at Cambridge University to decide whether iron and steel should be abandoned for certain applications in favor of more expensive materials. The research took the form of studies to determine possible methods of protecting iron and steel against corrosion.

Three types of corrosion problems were studied. The first of these was the protection of iron and steel carrying mill-scale, rust, water, and possibly grease. Such surfaces can be protected either by removing the foreign matter and applying protective treatment to the cleaned surface, or by applying certain types of paints to uncleaned surfaces to inhibit further corrosion.

The second problem studied was the development of safe and efficient inhibitive treatment for cooling systems. Results indicated that the alternate use of cathodic and anodic inhibitors might provide a safe and efficient combination.

The third problem studied was that of corrosion fatigue. It was indicated that short periods of exposure to corrosive conditions were as dangerous or even more dangerous than longer periods of exposure. This emphasized the need for preventing even short exposures of parts subjected to alternating stresses, to corrosive conditions. Painting with zinc-rich paints will greatly prolong corrosion fatigue life.

Cupola Practice

BASIC. *"First Report on the Basic Cupola by the Melting Furnaces Sub-Committee,"* FOUNDRY TRADE JOURNAL, September 14, 1944, vol. 74, no. 1465, pp. 25-28; September 21, 1944, vol. 74, no. 1466, pp. 55-59; September 28, 1944, vol. 74, no. 1467, pp. 71-74.

Improvements in basic refractories, particularly basic refractory patching materials, have been responsible for recent experimenting with basic-lined cupolas. A new stabilized dolomite clinker is now being made into satisfactory lining materials in both brick and monolithic forms.

After reviewing previous experiments in basic cupola melting, the sub-committee discusses stabilized dolomite monolithic lining. Included in the discussion are methods of installing, drying, and patching the lining; lining life; and methods of improving lining life. Basic brick linings are also described.

Basic linings make it possible to maintain a sufficiently basic slag to desulphurize and dephosphorize the iron. An incidental result is an increase in carbon content of the melted metal. Desulphurization is carried out very successfully. It has been found, however, that the success of dephosphorization is dependent upon the silicon content.

The use of the basic cupola would not only make possible the use of cupola metal for applications requiring low sulphur or low phosphorus, but would also permit the use of higher proportions of scrap in the cupola charge and higher-phosphorus ore in the blast furnace.

Dephosphorizing

IRON. *(See Cupola Practice, Basic.)*

Desulphurizing

IRON. *(See Cupola Practice, Basic.)*

Die Casting

ALUMINUM. *(See Aluminum - Base Alloys.)*

TIN-BASE. *"Special Applications for Tin Base Die Castings,"* H. M. Fraser, DIE CASTING, December, 1944, vol. 2, no. 12, pp. 41-43.

Characteristics of tin-base alloys which make them desirable for various applications of die cast parts are dimensional stability, fluidity in molten form, high corrosion resistance, good machinability, and ability to take almost any kind of finish or to stand up without any finish. Among the outstanding applications for which tin-base alloy die castings are desirable are parts which come into contact with food and drinks for human consumption, and small and interchangeable parts of many mechanisms which require intricacy of design and close dimensional tolerances.

Fatigue

SURFACE HARDENING. *"Some Needed Precautions When Induction and Flame Hardening,"* J. O. Almen, METAL PROGRESS, December, 1944, vol. 46, no. 6, pp. 1263-1267.

Surface hardening treatments, in general, induce a residual compressive stress in the outer layers of a part which increases the fatigue life of the outer layers. Carburizing, nitriding, flame hardening, and induction hardening all do this. The last two processes—flame hardening and induction hardening—do impart a residual compressive stress to the outer layers of the treated part; but at the same time they weaken the inner layers which are not heated to above the hardening temperature, but only to a temperature high enough to effectively anneal and weaken the inner layers. On cooling, the inner layers are apt to be left with a residual tensile stress, which further weakens the part when additional alternating tensile stresses are applied.

The author discusses the application of various methods of surface hardening and gives precautions to be observed to avoid the weakening effect of induction and flame hardening.

SHOT PEENING. *(See Shot Peening.)*

Finishes

ELECTROLYTIC POLISHING. *"Electrolytic Polishing,"* S. Wernick, STEEL, December 11, 1944, vol. 115, no. 24, pp. 146, 148, 176, 178, 180.

Electrolytic polishing probably will prove suitable for many types of alloys. Up to date, however, it has been used on a commercial basis only for stainless steel. Perhaps the reason for this is that the nature of stainless steel makes all mechanical polishing operations difficult and expensive.

Two electrolytic processes have proven successful for stainless steel. One uses phosphoric acid as an electrolyte while the other uses sulphuric acid. High solution temperatures and high current densities are used for the processes. Curved or contoured parts are particularly suited to polishing by this method.

Combinations of mechanical and electrolytic polishing often give the best results and are desirable from an economic point of view.

Furnaces

INDUCTION. *"Plant Layout for High Frequency Melting,"* George F. Applegate, THE FOUNDRY, December, 1944, vol. 72, no. 12, pp. 84-87, 86, 202, 204, 206.

The author discusses the principles of good foundry planning in order to derive the greatest benefits from high frequency melting. He emphasizes the importance of getting the proper combination of furnaces to handle effectively all melting within the foundry. He discusses power sources, types of furnaces, location of furnaces in the foundry, auxiliary equipment which can be used with the furnaces, and methods of pouring from the furnaces.

Gray Cast Iron

APPLICATIONS. *"Cast Iron Thread Gages,"* C. C. Taggart, METALS AND ALLOYS, December, 1944, vol. 20, no. 6, pp. 1607-1670.

The demand for steel gages for dimensional inspection greatly exceeds the supply. The author's company solved the problem of thread gage supply by making them from high strength cast iron. The method of manufacture, savings resulting from the change in material, and the use and performance of cast iron gages are described in this article.

CASTINGS REPAIRS. *(See Salvage.)*

CASTINGS REPAIR. *"Salvaging of Large Cast Iron Castings,"* H. O. Quartz, THE IRON AGE, November 30, L 1944, vol. 154, no. 22, pp. 52-56.

A description of possible ways of salvaging large gray iron castings which require much time and expense to duplicate.

CORROSION. *(See Corrosion.)*

PROMOTION. *"Gray Iron in the Post-war Period,"* Donald J. Reese, THE FOUNDRY, January, 1945, vol. 73, no. 1, pp. 85, 220, 222, 224, 226.

The author discusses some of the factors which will affect postwar use of gray iron castings and emphasizes the need for fully acquainting the public with the characteristics and possible applications of gray iron.

Good Housekeeping

MECHANIZATION. *"Mechanization Aids Good Housekeeping,"* Lester B. Knight, THE FOUNDRY, January, 1945, vol. 73, no. 1, pp. 76-78, 156.

The installation of mechanized equipment in the foundry will greatly facilitate but will not necessarily insure good housekeeping in the foundry. When mechanical equipment is installed, an improvement in housekeeping generally results because of the need to keep the mechanical equipment in working order. However, in the end, the condition and appearance of a foundry depend upon the supervision and workmen who may use mechanical equipment to make their job easier or more profitable.

Charging devices constitute the greater part of the mechanical equipment in the melting department. Sand preparation equipment, molding equipment, monorail systems, overhead cranes, and burners equipped with ladle heating stands comprise the larger part of the mechanical equipment in the sand and molding departments. Overhead monorail systems, tower ovens, and hand or motor driven lift trucks improve working conditions in the core department. In the cleaning room, core knockout equipment, blast cabinets and barrels, and swing or stand grinders, all equipped with suitable exhaust systems, greatly improve working conditions and eliminate many of the cleaning room hazards.

Heat Transfer

FREEZING RATES. *"How Fast Do Metals Freeze?"* Harry A. Schwartz, THE FOUNDRY, December, 1944, vol. 72, no. 12, pp. 80-81, 236, 238, 240, 242, 244.

A mathematical analysis of the freezing rate of castings in sand molds. The author cites experiments performed by different individuals in which different freezing rates for steel castings were obtained. He suggests that radiation and convection may have influenced the apparent thermal conductivity of the sand and that this was responsible for the differences in freezing rates obtained by the experimenters.

Heat Treatment

STEEL. *"Continuous Heat Treating of Armor Steel Castings,"* Edwin F. Cone, METALS AND ALLOYS, December, 1944, vol. 20, no. 6, pp. 1593-1597.

A description of the engineering problems involved and the plant methods and equipment used in order to accomplish the continuous heat treating of large cast steel tank components to close mechanical property tolerances and production requirements.

SURFACE HARDENING. *(See Fatigue.)*

SUBZERO. *"Subzero Treatment of Steels,"* H. C. Amtsberg, WESTERN METALS, December, 1944, vol. 2, no. 12, pp. 34, 36-38.

Combinations of subzero treatment and tempering are helpful in effecting one hundred per cent transformation of austenite to martensite in steels which ordinarily would cool to room temperature with varying amounts of retained austenite. Details of subzero treatments are given by the author.

Inhibitors

MAGNESIUM SANDS. *(See Sand.)*

Inspection

MAGNETIC. *(See Non-Destructive Testing.)*

Magnesium-Base Alloys

FINISHES. *(See Protective Coatings.)*

GRAIN SIZE. *"The Application of Grain-Size Determination to Magnesium Alloys,"* C. H. Mahoney and A. L. Tarr, A.S.T.M. BULLETIN, October, 1944, no. 130, pp. 15-20.

After discussing the importance of a standard method for measuring grain size, the authors propose a method of determination and recording magnesium grain size and give directions for the preparation of magnesium alloy specimens for determining the grain size. The method they propose is a modification of the A.S.T.M.'s standards for austenitic grain sizes in steel.

PATTERNS. *(See Patternmaking.)*

PERMANENT MOLD CASTINGS. *(See Permanent Mold Castings.)*

PRESSURE CASTINGS. *"Magnesium Castings for High Pressure Service,"* W. O. Wetmore and T. W. F. Foster, ALUMINUM AND MAGNESIUM, November, 1944, vol. 1, no. 2, pp. 18-19, 43.

Experiments performed on both sand castings and centrifuged castings showed that all test castings withstood a hydraulic pressure of 2500 psi. One casting made by each method withstood 5000 psi., which was the upper limit of the testing equipment. One casting made by each method failed at 4500 psi. The work indicated that magnesium alloys could be cast to withstand high internal pressures.

Management

WAGE INCENTIVES. *"Wage Incentive Plans in Foundries,"* William H. Spencer, THE FOUNDRY, vol. 72, no. 12, pp. 79, 223-224, 226.

A discussion of various incentive plans and the factors which are responsible for their success or failure.

Materials Handling

SLINGS. *"Repairs and Maintenance: Slings for Lifting,"* MECHANICAL HANDLING, December, 1944, vol. 31, no. 12, pp. 588-589.

Recommendations concerning the use and maintenance of slings.

CRUCIBLE CARE. *(See Crucibles.)*

INDUCTION FURNACE. *(See Furnaces.)*

Mold Drying

TORCH. *"Propane Torch for Sand Mold Drying,"* WESTERN METALS, December, 1944, vol. 2, no. 12, p. 21.

A report of a propane-burning torch developed for the purpose of drying green sand molds. The torch, which reduces drying time and leaves a clean mold surface, may be used individually on small molds or in units of several torches on larger molds.

Non-Destructive Testing

MAGNETIC INSPECTION. *"Symposium on Magnetic Particle Testing,"* A S T M BULLETIN, December, 1944, no. 131, pp. 7-16.

Abstracts of papers on magnetic particle testing presented at sessions in Philadelphia, Monday, January 22.

Included in the symposium are abstracts of the following articles: "Equipment for Magnetic Particle Inspection," by A. V. de Forest and C. E. Betz; "Magnetic Particle Inspection, Particularly from the Standpoint of Specification Requirements," by H. H. Lester; "Magnetic Particle Inspection of Aircraft Parts," by E. O. Dixon; "The Magnetic Particle Test as Utilized by the Railroads," by L. B. Jones; "Specifications and Procedures," by A. P. Spooner; "Magnetic Powder Inspection of Castings," by Clyde L. Frear; "Magnetic Particle Inspection of Forgings," by Clarence J. Boyle; and "Miscellaneous Applications of the Magnetic Particle Test," by E. A. Snader.

Patternmaking

MAGNESIUM CASTINGS. *"Patterns for Magnesium Castings,"* Harry J. Jacobson, THE FOUNDRY, December, 1944, vol. 72, no. 12, pp. 87, 192, 196.

Because the ultimate use of magnesium-base castings is so often for parts which permit very small dimensional variations, patterns for magnesium-base castings assume a considerable importance. This article discusses the means by which metal patterns can be made to produce castings having the specified dimensional tolerances.

Patterns

PROPELLER. *"Patterns for Propellers,"* Herbert J. McCaslin, THE FOUNDRY, January, 1945, vol. 73, no. 1, pp. 82-84, 214, 216, 218.

The author describes in detail the method of making patterns for propellers, using a laminated construction in which the grain of the wood lies in a transverse direction to the radial center of the hub.

Permanent Mold Castings

LIGHT METAL. *"Light-Metal Permanent Mold Castings,"* L. F. Swoboda, THE FOUNDRY, January, 1945, vol. 73, no. 1, pp. 72-74, 176, 180, 182, 184.

The author discusses the advantages and characteristics of aluminum and magnesium-base alloy castings made by the permanent mold process, as well as some of the factors to be considered in designing permanent mold castings. In summarizing, the author states that the use of permanent mold castings should be considered when superior cast metal structure, smooth surfaces, and uniformity of size, weight, and section thickness are desired; when production quantities of the castings are anticipated; and where an economical process for maintaining high production is necessary.

Permanent Molds

ALUMINUM. *(See Aluminum - Base Alloys.)*

Plant Layout

REDESIGN. *"Redesigning a Foundry for Maximum Efficiency,"* R. W. Bierwagen, THE FOUNDRY, vol. 72, no. 12, pp. 74-78, 106.

A description of the redesign of a gray iron foundry to meet the war needs for castings production. In redesigning, attention was given to the flow of materials through the plant, production facilities, and control facilities.

Precision Casting

EQUIPMENT AND MATERIAL. *"Equipment and Material for Precision Casting,"* J. Albin, THE IRON AGE, November 9, 1944, vol. 154, no. 19, pp. 52-58; November 16, 1944, vol. 154, no. 20, pp. 53-59.

A detailed description of pattern waxes, wax molds, investment materials, units for vacuuming and heating the investments, melting furnaces, crucibles, and casting machines for making precision castings. The foregoing items are nearly all modifications of equipment which has long been used by manufacturers of jewelry and dentures.

Protective Coatings

MAGNESIUM-BASE ALLOYS. *"Organic Finishes for Magnesium,"* Gilbert C. Close, LIGHT METAL AGE, November, 1944, vol. 2, no. 7, pp. 20-22.

The proper type of finish for a magnesium part depends upon the conditions under which it is to be used. For most applications, however, the most satisfactory performance is obtained from a combination of surface treatment and organic finishes. Most magnesium products are di-chromated when they are received from the producer. Prime coats and top coats applied over the surface treatment greatly increase the protection against corrosion.

The primer is of considerable importance, for it must not only protect the metal from corrosion, but it must also serve as a bonding layer between the base metal and further coats of organic finishes. The primer should resist salt water and moisture penetration, adhere well to the metal or oxide film, provide a good bonding surface for subsequent coats, be tough and flexible, and inhibit corrosion. The value of a primer is further enhanced if it is rapid drying, unaffected by subsequent coats, impervious to actinic rays, insoluble in gasoline and hydrocarbons, and may be removed without damaging the base metal.

Numerous types of top coats are available to satisfactorily cover the primer coat and to give protection under varying service conditions.

Refractories

CARBON AND GRAPHITE. *"Carbon and Graphite Mold Plugs and Stool Inserts,"* V. N. Nolan, STEEL, December 25, 1944, vol. 115, no. 26, pp. 94, 96, 120.

Carbon and graphite have a combination of properties which make them well suited for certain metallurgical operations, such as the production of low and high carbon steels, copper and brass, tungsten carbide tools, and cobalt-chromium-tungsten alloys. The most important of these properties are a very low rate of heat transfer, low coefficient of thermal expansion, high resistance to thermal shock, resistance to deformation at high temperatures, and the fact that hot metal will not stick to carbon as it will to other materials.

The use of carbon mold plugs and stools reduces the amount of strain and tear on an ingot mold and permits the metal to remain liquid for a sufficient time to permit escape of gases. Carbon and graphite molds have been used for more years than have mold plugs and stools. The author includes a formula for the calculation of the approximate size of a graphite mold for various applications.

Salvage

CASTINGS REPAIR. *(See Gray Cast Iron.)*

CASTINGS REPAIRS. *"Repairing Defective Automotive Gray Iron Castings,"* THE FOUNDRY, January, 1945, vol. 73, no. 1, pp. 86, 160, 162, 164, 168, 170.

This article describes the recommended shop procedures for making the repairs of defective automotive gray iron castings as outlined in OCO-D Engineering Bulletin No. 152. The article discusses approved repair practices, unsatisfactory repair practices, urges the production of better castings, and attempts to avoid misunderstandings between castings producers and the Army Services about the quality of cast products.

MAGNESIUM CASTINGS. *"Modern Impregnating of Magnesium Castings,"* Harold A. Knight, METALS AND ALLOYS, December, 1944, vol. 20, no. 6, pp. 1625-1630.

A means of repairing porosity in magnesium castings by means of impregnating the castings with a compound of an alkyd resin fatty acid and monomeric styrene, which on subsequent baking or curing forms a copolymer which effectively seals the porosity.

Shot Peening

APPLICATIONS. *"How Cadillac Uses Production Shot Peening,"* R. L. Orth, STEEL, December 18, 1944, vol. 115, no. 25, pp. 89, 131.

Shot peening is used by the Cadillac Motor Company to impart a residual surface compressive stress to metal parts subjected to tension or torsional stresses, thereby increasing the fatigue life of the parts. The manner in which this process is performed on connecting rods and transmission gears is described in this article.

Spectrographic Analysis

APPLICATION. *(See Analysis.)*

Steel

CONVERTER. *"New Design of Side Blown Converter Plants,"* THE IRON AGE, December 14, 1944, vol. 154, no. 24, p. 58.

An account of the British practice of successfully blowing low silicon irons in a side blown converter. A necessary feature of the practice is an intermediate furnace to heat the iron above the temperature at which it comes from the cupola before it is poured into the converter.

CORROSION. *(See Corrosion.)*

ELECTRIC STEEL PRACTICE. *"Working a Heat of Acid Electric Steel,"* Conrad C. Wissmann, METAL PROGRESS, December, 1944, vol. 46, no. 6, pp. 1277-1284.

The author discusses the working of an acid electric steel heat from the time that the charge is completely melted until it is tapped. He discusses the "boil," how it is started and stopped, the desirable amount of carbon at the end of the boil, the undesirable "silicon boil," and the danger of over-oxidized or over-reduced baths and how to prevent their occurrences.

HARDENABILITY. *"Hardenability and Interchangeability of Cast Steels,"* H. A. Schwartz, THE IRON AGE, November 23, 1944, vol. 154, no. 21, pp. 42-46.

The author presents data which indicate that steels having equal hardenability do not necessarily have the same combination of physical properties. This should be kept in mind when using hardenability as a measure of interchangeability.

HEAT TREATMENT. *(See Heat Treatment.)*

NITROGEN CONTENT. *(See Chemical Analysis.)*

SUBZERO TREATMENT. *(See Heat Treatment.)*

Tin-Base Alloys

DIE CASTINGS. *(See Die Castings.)*

Vanadium

IN GRAY IRON. *(See Alloy Cast Iron.)*

Women Workers

GRAY IRON FOUNDRY. *"Women Prove Capable as Bench Molders,"* THE FOUNDRY, January, 1945, vol. 73, no. 1, pp. 79, 173-174.

A description of the experience of the Saco-Lowell Shops, which have employed women in the foundry since 1940. Women first worked in the core rooms, but have since been assigned to crane operation, bench molding, sand preparation, and grinding of castings.

Zinc-Base Alloys

CASTABILITY. *"Zinc Casting Alloys,"* E. Pelzel and H. Schneider, METAL INDUSTRY, October 27, 1944, vol. 65, no. 17, pp. 258-260; November 3, 1944, vol. 65, no. 18, pp. 278-280. Translated from ZEITSCHRIFT FUR METALLKUNDE.

A consideration of specific volume and thermal expansion in solid and molten

states and an evaluation of castability from volume changes for zinc-aluminum and zinc-copper alloys.

CORROSION. *"Intercrystalline Corrosion,"* Lisel Koch, METAL INDUSTRY, November 17, 1944, vol. 65, no. 20, pp. 310-311. Translated by the Zinc Development Association from METALLWIRTSCHAFT.

Comparative tests on high-zinc alloys to study the combined effects of the state of the metal and the aluminum content on attack by steam. The effects of the state of the metal were not always consistent. However, the tests showed that even minute amounts of aluminum had a pronounced accelerating effect on the zinc-base alloys. In fact, the author concludes that either aluminum or an aluminum-zinc solid solution should be considered the primary cause of intercrystalline corrosion in zinc-base alloys and that the effect of lead is secondary.

Schedule of February Chapter Meetings

February 1

Saginaw Valley Section, Detroit
Fischer's Hotel, Frankenmuth, Mich.
A. L. BOEGEHOLD
General Motors Corp.
"Modern Cast Irons"

✦ ✦

February 3

Western New York and Rochester
Hotel Buffalo, Buffalo, N. Y.
JOINT MEETING

✦ ✦

February 5

Central Indiana
Athenaeum, Indianapolis
Caterpillar Tractor Co.
"Casting Design"

✦

Chicago
Chicago Bar Ass'n Restaurant
General Meeting
"Job Evaluation and Time Study"

✦

Metropolitan
Essex House, Newark, N. J.
ROUND TABLE MEETING
"Gating and Risering"

✦ ✦

February 6

Michiana
LaSalle Hotel, South Bend, Ind.
N. J. DUNBECK
Eastern Clay Products Co.
"Synthetic Foundry Sands"

✦ ✦

February 8

Northeastern Ohio
Cleveland Club, Cleveland
F. J. WURSCHER
Semet-Solvay Corp.
"'Z' Metal and Its Production"

✦

St. Louis
DeSoto Hotel, St. Louis
NATHAN JANCO
Centrifugal Casting Machine Co.
"Centrifugal Steel Castings"

✦

Texas
Rice Hotel, Houston
E. T. KINDT
Kindt-Collins Co.
"Equipment for Construction of Patterns"

✦ ✦

February 9

Central New York
Onondaga Hotel, Syracuse
JOHN LOWE
Hansell-Elcock Co.
"Cupola Practice"

Philadelphia
Engineers' Club, Philadelphia
J. W. JUPPENLATZ
Lebanon Steel Foundry
"Casting Qualities and Methods of Testing"
NATIONAL OFFICERS' NIGHT

✦ ✦

February 12

Cincinnati
Engineering Society Headquarters, Cincinnati
LAWRENCE PRIDMORE
International Molding Machine Co
"Core Blowing"

✦ ✦

February 15

Canton District
Elks' Club, Alliance, Ohio
ROUND TABLE MEETING
Cast Iron, Steel, Non-Ferrous, Patterns

✦

Detroit
Rackham Educational Memorial
ROUND TABLE MEETING
Aluminum, Brass, Steel

✦ ✦

February 16

Eastern Canada and Newfoundland
Mount Royal Hotel, Montreal
ROUND TABLE MEETING
Iron, Bronze, Steel

✦

Southern California
Los Angeles Elks' Club
NATIONAL OFFICERS' AND PAST PRESIDENTS' NIGHT

✦ ✦

February 19

Northern California
Engineers' Club, San Francisco
JOINT MEETING WITH ASM

✦

Northern Illinois-Southern Wisconsin
Hotel Faust, Rockford, Ill.
J. H. VAN DEVENTER
"Iron Age"
JOINT MEETING WITH ROCK RIVER VALLEY ENGINEERING COUNCIL

✦

Quad City
Ft. Armstrong Hotel, Rock Island, Ill.
F. G. SEFING
International Nickel Co.
"Molding Methods for Production of Sound Castings"

✦ ✦

February 20

Twin City
Curtis Hotel, Minneapolis
E. A. WALCHER
Ohio Steel Foundry Co.
"Cast Steel Breech Rings for Guns"

February 23

Ontario
Royal York Hotel, Toronto
ROUND TABLE MEETING
"Testing Castings"

✦ ✦

February 26

Central Ohio
Fort Hayes Hotel, Columbus, Ohio
J. B. CAINE
Sawbrook Steel Castings Co.
"Why Heat Treat"
A. S. KLOPF
Firegan Sales Co.
"Casting Defects in Gray Iron Castings"

✦

Chesapeake
Engineers' Club, Baltimore
ROUND TABLE MEETING

✦ ✦

February 27

Toledo
Toledo Yacht Club
E. C. ZIRZOW
National Malleabe & Steel Castings Co.
"Sand"

✦ ✦

MARCH MEETINGS

March 1

Saginaw Valley, Detroit
Fischer's Hotel, Frankenmuth
J. A. GITZEN
Delta Oil Products Co.
"Properties of Core Binders and Washes"

✦ ✦

March 5

Central Indiana
Athenaeum, Indianapolis
CARL JAPFFE
Rustless Iron & Steel Corp.
"Porosity in Steel and Cast Iron"

✦

Chicago
Chicago Bar Ass'n Restaur
ROUND TABLE MEETI
Gray Iron, Non-Ferrous,
Steel and Patter

✦

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